THE EXPLOSIVES ENGINEER

REG. U. S. PAT. OFF.

Forerunner of Progress in Mining, Quarrying, Construction

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Views and opinions expressed by the authors of articles in this publication are their own, and they do not necessarily represent those of the publisher.

BEGINNING on page 71, we present a summary of the results of the National Safety Competition of 1952, by Seth T. Reese, chief, Accident Analysis Branch, Health and Safety Division, Bureau of Mines, U. S. Department of the Interior. One especially noteworthy feature of the 1952 contest was that, for the first time in the 28-year history of this nation-wide competition, the six winners in their respective mineral classifications reported records of no lost-time injuries during the year. We extend congratulations to the employes of the six winning properties and to each man in the plants enrolled in the contest for having joined with thousands of fellow workmen in a sincere effort to foster accident prevention in the mineral industry.

Outstanding Achievements

In his article, Mr. Reese reports a total of 603 mines and quarries located in 40 states as participants in the 1952 contest. Accident-free records were made by 186 mines and quarries, representing 30.8 per cent of the total enrollment. New low records in both injury-frequency and injury-severity rates were made in the bituminous-coal underground mine group. A new low injury-frequency rate was recorded in the anthracite underground mine group. The overall frequency rate of 28.131 injuries per one million man-hours of worktime virtually equaled the best previous rate of 28.065 established in 1951. Last year's severity rate of 5.812 days lost per one thousand man-hours of work was only slightly above the previous best rate of 5.555 days established in the 1949 competition.

Awards to the Winners

A bronze Sentinels of Safety trophy, donated by THE EXPLOSIVES ENGINEER, is awarded to the winning mine and quarry in each of six groups, to be held for one year. Every employe of these six winning plants receives a Certificate of Achievement in Safety signed by the director of the United States Bureau of Mines. To supplement the awards of the trophies and certificates, THE EXPLOSIVES ENGINEER also presents a green-and-white Sentinels of Safety flag to each company winner. Public presentation ceremonies are held each year at the mines and quarries that come out on top.

Competition Stimulates Interest in Safety

Statistics of the competition show that, year after year, the average mine and quarry participating have a better safety record than the average mine and quarry in the country not enrolled in the competition. The records of the 1952 competition show clearly the effectiveness of this contest as a practical means of promoting safety at mineral operations where safety is practiced efficiently and effectively every working day. Furthermore, the 1952 results are of special significance in that the enrolled plants were operated throughout the year under conditions demanding all-out production of minerals vital to the Nation's defense effort. The participating plants and companies deserve our sincere gratitude in meeting unusually heavy production schedules and, at the same time, conserving manpower through improving their safety records.

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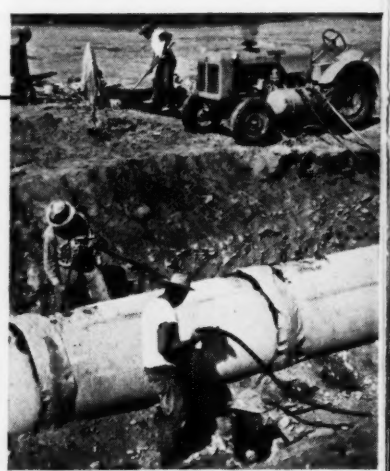

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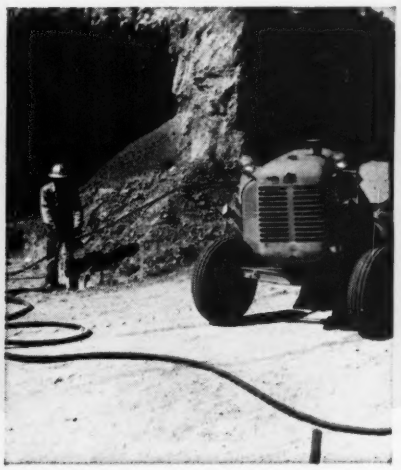
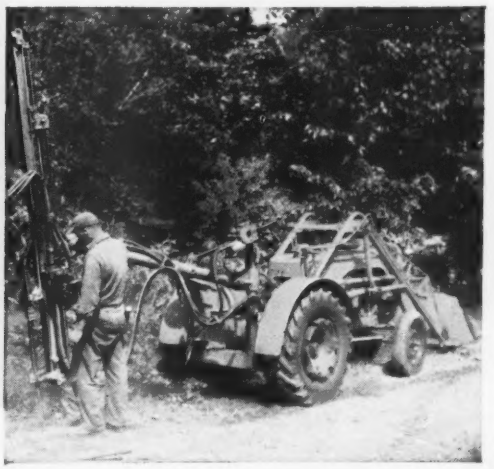




Samuel Davis Sturgis, Jr.

MAJOR GENERAL, UNITED STATES ARMY
CHIEF OF ENGINEERS

A Biography

THE distinguished career of Major General Samuel Davis Sturgis, Jr., Corps of Engineers, Department of the Army, was fittingly recognized recently by his appointment as chief of engineers. His success in his chosen profession offers eloquent testimony to the rewards that come from persistent application of natural abilities in one field of endeavor.

Sam, as he is known to his friends, was born in St. Paul, Minnesota, July 16, 1897, the son of Major General Samuel D. and Bertha (Bement) Sturgis. His father commanded the 87th Division in World War I; his grandfather, Brevet Major General Samuel D. Sturgis, was a prominent leader of U. S. Army forces during the Civil War; his uncle, Lieutenant J. G. Sturgis, an officer with the 7th Cavalry, was killed in the battle of Little Big Horn in 1876.

After completing his elementary education in local schools, Sam went to the University of Minnesota in 1915. At the end of the freshman year, he accepted an appointment to the U. S. Military Academy at West Point, from where he was graduated on June 12, 1918. Following the graduation exercises, he was commissioned a second lieutenant in the Corps of Engineers, Regular Army, and was assigned with the 3rd Engineer Training Regiment at Camp Humphreys (now Fort Belvoir), Virginia. Shortly afterward, he was sent to Camp Lee, Virginia, to take a special course at Engineer Officers' Training School. Upon completion of the course, the young officer was assigned to the 9th Engineers, Mounted, at Camp Courchesne, New Mexico, where he served successively as company commander, adjutant, and battalion commander.

In 1919, he was returned to Camp Humphreys to attend the Engineer School of Application, graduating in June, 1920. The course included a trip to Europe, where for several months he studied the combat and logistical operations of the AEF on the Western Front.

In August, 1922, Sam was assigned to the Military Academy at West Point as an instructor of cadets in the departments of mathematics and engineering. After four years at the Academy, he was moved to the Philippines and served as adjutant, and later as commanding officer of the 14th Engineers. During this assignment, which lasted about three years, he was employed on strategical studies throughout the Philippine Archipelago, including the defense of Bataan, utilized some fifteen years later. Upon his return to the United States, he rejoined his old battalion, the 9th Engineers, Mounted, at Fort Riley, Kansas.

In 1933, he was moved to Fort Leavenworth, Kansas, to take a two-year course in the Command and General Staff School. After graduation in 1935, he was sent to Eastport, Maine, as assistant to the district engineer on the Passamoquoddy Tidal Power Development. Serving later as district engineer, he completed the construction under way and liquidated the project when funds were transferred.

Following the Ohio River flood in 1937, he was detailed with the Huntington, West Virginia, Engineer District, serving as executive officer of construction work on the Ohio River and its tributaries. After two years at Huntington, he entered the Army War College. Upon graduating eight months later, he was assigned to Vicksburg, Mississippi, as district engineer. During the next two and a half years, he initiated work under the 1941 revised flood-control program on the lower Mississippi and directed a $200,000,000 construction program of essential installations, which later contributed to the rapid prosecution of World War II.

In December, 1942, he was ordered to proceed to Australia to become chief engineer of the 6th Army, at the request of General Walter Kreuger. During the next three and one-half years, he participated in campaigns in the New Guinea, New Britain, and Admiralty Islands; the invasion of Leyte; the conquest of Luzon; and the occupation of the Japanese Islands.

From February, 1946, to March, 1952, he served as air engineer at Air Force headquarters; as deputy chief of the Operations Training Division (G-3), War Department General Staff; as division engineer of the Missouri River Division; as commanding general of the 6th Armored Division at Fort Leonard Wood.

In March, 1952, General Sturgis was appointed commander of the Communications Zone, U. S. Army, Europe, with headquarters at Orleans, France, and commander of all Army forces in France. Eight months later, he returned to this country to accept appointment as chief of engineers.

Samuel Davis Sturgis, Jr., married Frances Jewett Murray on January 28, 1922, at Governor's Island, New York. They have one daughter, Harriet Murray, wife of First Lieutenant Richard C. Knox, U.S.M.C. The Sturgis home is at 1869 Wyoming Avenue, N.W., Washington, D. C.

General Sturgis' decorations include the Silver Star, the Legion of Merit, the Bronze Star Medal, and the Distinguished Service Medal.

He is a member of Chi Psi fraternity. His clubs include The Army and Navy Country Club, The Army and Navy Club of Washington, D. C., and the Omaha Club of Omaha, Nebraska.

MAJOR GENERAL SAMUEL DAVIS STURGIS, JR.

THE WINNERS–1952

ANTHRACITE

HUNTER TUNNEL MINE
PHILADELPHIA AND READING
COAL AND IRON COMPANY
Ashland, Pennsylvania

BITUMINOUS-COAL

SHORT CREEK MINE
TENNESSEE COAL & IRON DIVISION
UNITED STATES STEEL CORPORATION
Adamsville, Alabama

OPEN-PIT

NORALYN MINE
INTERNATIONAL MINERALS
AND CHEMICAL CORPORATION
Bartow, Florida

METAL

BUCK MINE
THE VERONA MINING COMPANY
PICKANDS MATHER & COMPANY
Caspian, Michigan

NONMETALLIC

ANNANDALE MINE
MICHIGAN LIMESTONE DIVISION
UNITED STATES STEEL CORPORATION
Boyers, Pennsylvania

"Let the worker carry around with him a mental picture of his wife and child, whose happiness depends upon his safe return after the day's work, and these loved ones become his surest sentinels of safety."

January 1925 The Explosives Engineer

QUARRIES

HILLSVILLE QUARRY
MICHIGAN LIMESTONE DIVISION
UNITED STATES STEEL CORPORATION
Hillsville, Pennsylvania

THE NATIONAL SAFETY COMPETITION OF 1952

Perfect safety records were made by 186 mines and quarries, representing 30.8 per cent of the total number of mineral industrial operations enrolled in the contest

SETH T. REESE

Chief, Accident Analysis Branch, Health and Safety Division
Bureau of Mines, U. S. Department of the Interior

For the first time in the 28-year history of the National Safety Competition, the winners in each of the six industrial classifications into which the competition is divided had perfect safety records of no lost-time injuries during 1952. More metal underground and open-pit mines were enrolled in last year's contest than ever before. New low records in both injury-frequency and injury-severity rates were made at bituminous-coal underground mines in 1952; also, a new low injury-frequency rate was recorded last year at anthracite underground mines.

The overall injury experience records of the 603 mines and quarries in the 1952 competition showed a frequency rate of 28.131 injuries per one million man-hours of worktime. The severity rate was 5.812 days lost per one thousand man-hours of work. The frequency rate in 1952 virtually equaled the all-time best record of 28.065 established in 1951; the severity rate last year was slightly above the previous low record rate of 5.555 days established in 1949.

Statistics of the competition show that, year after year, the average mine and quarry participating in this contest have a better safety record than the average mine or quarry in the country not enrolled in the competition. The records of the 1952 competition show clearly the effectiveness of this contest as a practical means of promoting safety at mineral operations where safety is more than a byword and where it is practiced efficiently and aggressively every working day. Furthermore, the results of the 1952 competition are of special significance in that the enrolled mines and quarries were operated throughout the year under conditions demanding all-out production of minerals vital to the Nation's defense effort. For their 1952 records, these plants and companies deserve immeasurable credit in meeting unusually heavy production schedules and, at the same time, conserving manpower through improving their safety records.

Outstanding features of the 1952 Competition:

1. **All six winners had perfect safety records.**
2. **No lost-time accidents at 186 mines and quarries.**
3. **New lows in injury-frequency and severity rates for bituminous-coal mines.**
4. **New low injury-frequency rate for anthracite mines.**

The records of the following mineral operations won top honors in the 1952 National Safety Competition:

Anthracite underground mines: Hunter Tunnel Mine of The Philadelphia and Reading Coal and Iron Company at Ashland, Pennsylvania.

Bituminous - coal underground mines: Short Creek coal mine of the Tennessee Coal and Iron Division, United States Steel Corporation at Adamsville, Alabama.

Metal underground mines: Buck mine, Pickands Mather and Company (The Verona Mining Company) at Caspian, Michigan.

Nonmetallic underground mines: Annandale limestone mine, Michigan Limestone Division, United States

THE ANTHRACITE WINNERS: With a record of no lost-time injuries during 77,336 man-hours of work in 1952, the Hunter Tunnel miners of The Philadelphia and Reading Coal and Iron Company at Ashland, Pennsylvania, won top safety honors in the anthracite group.

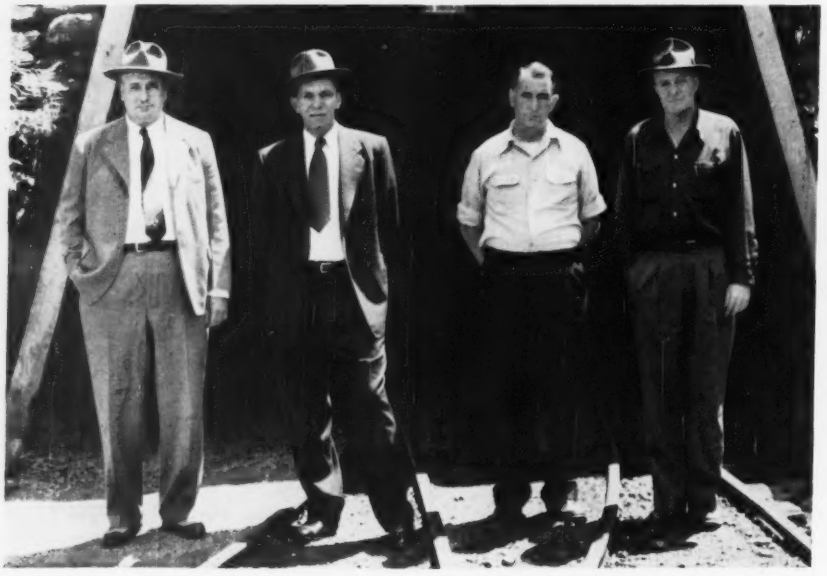
Steel Corporation at Boyers, Pennsylvania.

Open-pit mines: Noralyn phosphate pit of the International Minerals and Chemical Corporation at Bartow, Fla.

Quarries: Hillsville limestone quarry, Michigan Limestone Division, United States Steel Corporation at Hillsville, Pennsylvania.

As judged from past records, the injury experience in 1952 was considerably lower than the average over the 28 years of the contest. The frequency rate, although virtually identical with that recorded in 1951, was almost 39 per cent lower than the average. The severity rate, the second lowest rate in the overall record of 28 contests, was 28 per cent lower than the average. Improvements over the 1951 safety records, as measured in terms of frequency and severity, were particularly noteworthy at anthracite, bituminous-coal, and nonmetallic underground mines, and at quarries.

A total of 4,511 injuries was reported from the competing operations, with an aggregate time of exposure to hazard of approximately 160½ million man-hours. Of these, 104 (2.3 per cent) were fatalities, with a total time charge of 624,000 days lost. The time lost through the report of 4,407 nonfatal injuries was 307,974 days. The open-pit group had the lowest injury-frequency rate; the nonmetallic mine group, the lowest injury-severity rate; and the anthracite group had the highest rates on both counts of any of the six groups in the contest.



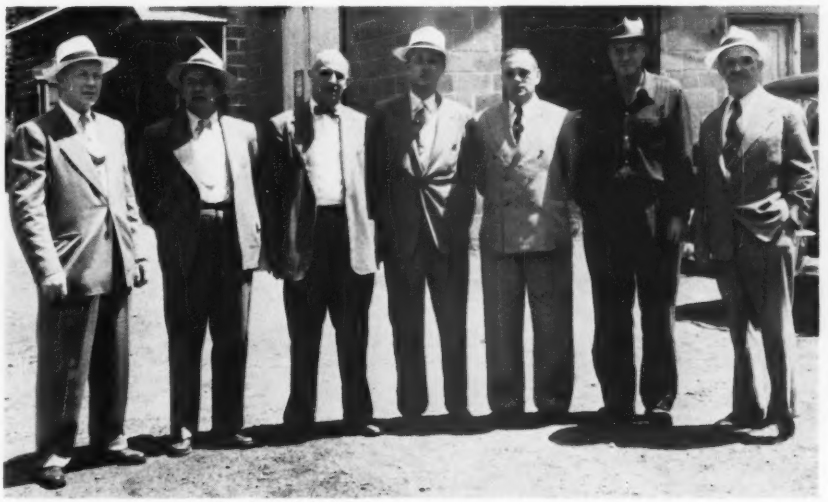
HUNTER TUNNEL SUPERVISORS: Left to right, Clare Wittig, assistant foreman; Joseph Stocofsky, fire boss; Marvin Schoffler, foreman; Clarence O. Whaite, superintendent.

The Basis of Awards

The Bureau of Mines, U. S. Department of the Interior, conducts the National Safety Competition each year. Since its origin in 1925, the contest has had a progressive effect in the promotion of accident-prevention work in mines and quarries throughout the country. Operations participating are grouped into six classifications: anthracite underground mines, bituminous-coal underground mines, metal underground mines, nonmetallic underground mines, open-pit mines, and quarries. The five mines and one quarry having the lowest injury-severity rates, or the number of days lost through disabling injuries for each 1,000 man-hours of worktime, are the winners in the groups in which they have enrolled. A bronze Sentinels of Safety trophy provided by THE EXPLO-

sives Engineer is presented to each of the six winners. When two or more competing plants have had injury-free records for the year, their ranking in the competition is determined by the number of man-hours worked. A disabling injury is defined as one which incapacitates the individual for time exceeding the remainder of the day on which he was injured. Fatal, permanent total, permanent partial, and temporary injuries are considered in calculating the severity rate of an operation.

In addition to the bronze trophy, a Sentinels of Safety flag, also donated by The Explosives Engineer, is awarded to each winner. This flag, in the traditional safety colors of green and white, when flown over a mine or quarry, serves as a daily reminder to the employes that practicing safety at all times pays big dividends. As a tribute to and in recognition of their part in making the best safety records among contestants, each employe and official at a winning plant is presented with a Certificate of Achievement in Safety by the Bureau of Mines. The certificates testify to the fact that the Sentinels of Safety trophy and flag could not have been won without the complete cooperation of each worker and supervisor. The certificates are also awarded to the next four ranking plants after the winner and to plants that had no disabling injuries during the year, provided 30,000 or more man-hours were worked.

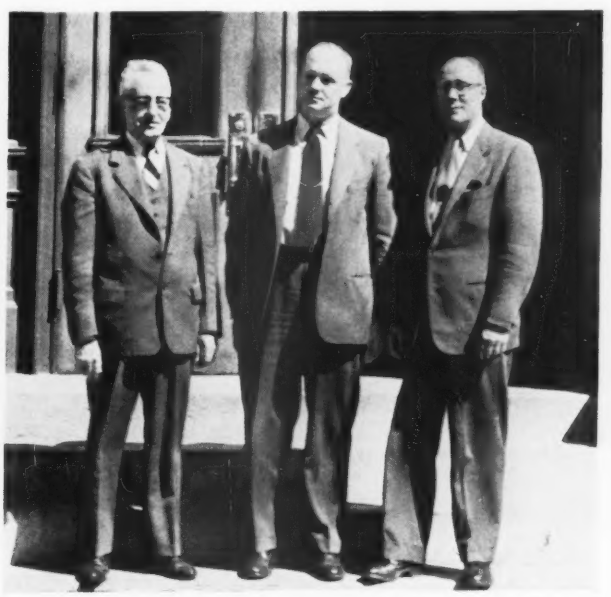


PROMOTERS OF SAFETY: Left to right, H. A. Schrecengost, Federal mine inspector; H. E. Shomper, state mine inspector; Hunter Tunnel mine's E. F. Morgan, division engineer; J. M. Manney, safety inspector; C. J. Decker, division superintendent; C. O. Whaite, colliery superintendent; H. A. Leidich, safety engineer.

The Committee of Award

The winners of the 1952 competition were selected by a seven-man group known as the Committee of Award. Each member of the committee is known nationally, not only for his industrial associations, but more especially for his demonstrated interest in the field of safety. The 1952 Committee of Award members were: Ned Dearborn, president, National Safety Council; L. C. Campbell, president, National Coal Association; Charles Ferguson, acting director, Safety Division, United Mine Workers of America; Howard I. Young, president,

MINERS' REPRESENTATIVES: The U.M.W. of A. committee at Hunter Tunnel mine includes, left to right, Joseph McDonald, Fred Woodward, and Edward Walsh.



P. & R. C. & I. OFFICIALS: Operations of The Philadelphia and Reading Coal and Iron Company are directed by, left to right, G. A. Roos, vice president; G. J. Clark, general manager; and G. A. Schnee, general superintendent.

TCI's PLANT: A view of the washer, supplementary buildings, and the railroad siding at TCI's Short Creek coal mine in Alabama.

SAFETY COMMITTEE: This happy group at TCI's Short Creek mine includes, left to right, R. L. Powers, company safety inspector; and the mine's safety committee members, Leon Reid, Glynn D. Lankford, and Robert F. McCants.

SHORT CREEK MINERS: Some of the employes at the Short Creek coal mine of Tennessee Coal and Iron Division, U. S. Steel Corporation, just before going underground at Adamsville, Alabama.

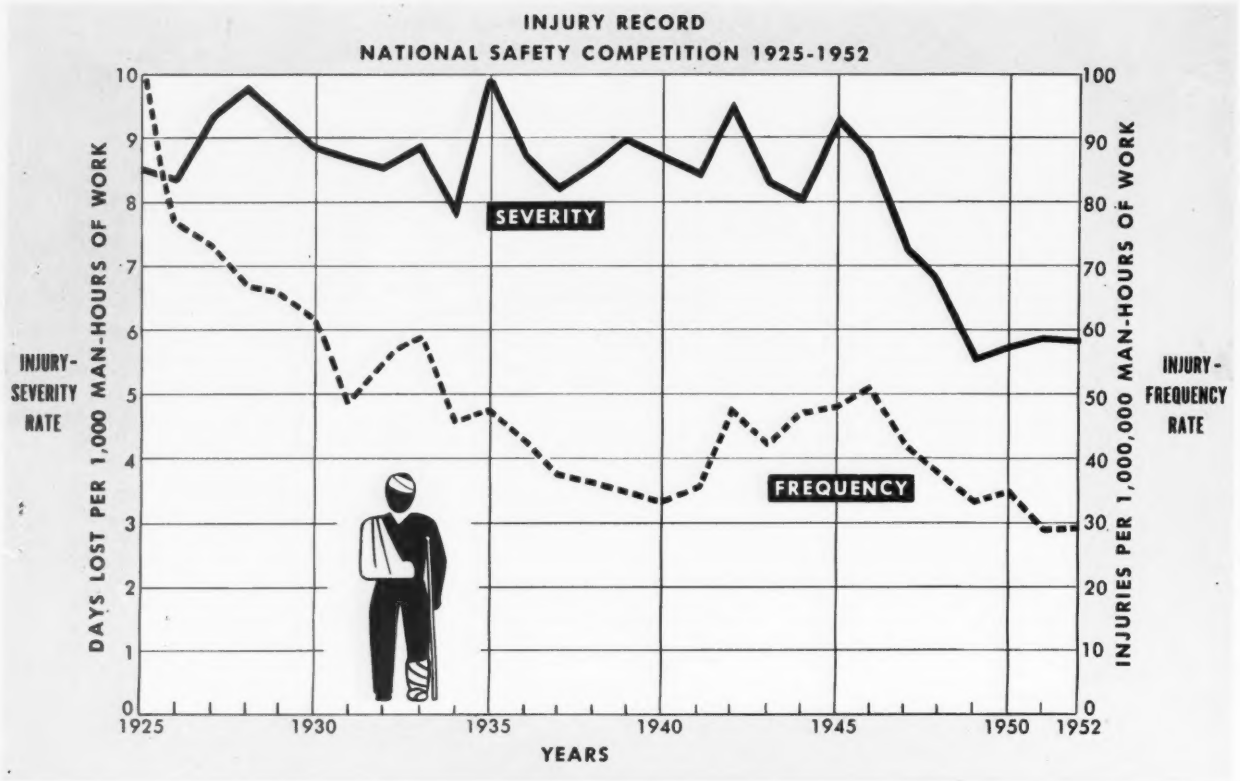
American Mining Congress; Andrew Fletcher, president, American Institute of Mining and Metallurgical Engineers; A. T. Goldbeck, engineering director, National Crushed Stone Association, Inc.; and C. D. Franks, executive vice president, Portland Cement Association.

Rules of the Competition

Any underground mine, open pit, or quarry located in the United States may enroll in the National Safety Competition. Eligibility for the award of the Sentinels of Safety trophy is restricted to properties that were operated at least 100 days with a total worktime of not less than 30,000 manhours during the contest year. The rules of the competition require the reporting of certain employment data, each lost-time injury, and days of disability, by a designated official at each

IN THE MINE: Loading out the coal following a blast at a working place in TCI's Short Creek coal mine at Adamsville, Alabama.

SHORT CREEK'S SUPERVISORS: A group of the men who supervise operations at the Short Creek mine of Tennessee Coal and Iron Division, U. S. Steel Corporation, Adamsville, Alabama.



SALIENT FEATURES OF THE NATIONAL SAFETY COMPETITION

1952

Type of Mine	*Number of Mines*	*Man-hours*	*Fatal Injuries*	*Nonfatal Injuries*	*Total*	*Days of Disability*	*Frequency Rate*	*Severity Rate*
Anthracite	51	17,673,580	22	1,420	1,442	201,378	81.591	11.394
Bituminous-coal	134	65,470,100	39	1,447	1,486	372,393	22.697	5.688
Metal	62	24,023,085	25	783	808	194,247	33.634	8.086
Nonmetallic mineral	47	9,554,502	1	195	196	17,761	20.514	1.859
Total	294	116,721,267	87	3,845	3,932	785,779	33.687	6.732
Open-pit	90	21,532,735	6	277	283	56,696	13.143	2.633
Quarries	219	22,103,234	11	285	296	89,499	13.392	4.049
Grand Total	603	160,357,236	104	4,407	4,511	931,974	28.131	5.812

TWENTY-EIGHT-YEAR HISTORY OF THE NATIONAL SAFETY COMPETITION

1925-1952

Type of Mine	*Man-hours*	*Fatal Injuries*	*Nonfatal Injuries*	*Total*	*Days of Disability*	*Frequency Rate*	*Severity Rate*
Anthracite	634,076,643	752	55,649	56,401	6,634,112	88.950	10.463
Bituminous-coal	1,301,543,090	1,338	58,197	59,535	12,703,421	45.742	9.760
Metal	490,296,066	404	17,183	17,587	3,505,323	35.870	7.149
Nonmetallic mineral	117,981,665	71	3,453	3,524	644,875	29.869	5.466
Total	2,543,897,464	2,565	134,482	137,047	23,487,731	53.873	9.233
Open-pit	283,965,781	88	4,805	4,893	854,959	17.231	3.011
Quarries	456,734,260	233	9,057	9,290	2,081,137	20.340	4.557
Grand Total	3,284,597,505	2,886	148,344	151,230	26,423,827	46.042	8.045

enrolled plant to the Bureau of Mines. At the end of the calendar year, all data are summarized and the basic statistics, from which injury-severity and frequency rates are derived, are submitted to the designated plant official for verification as to the accuracy and the completeness of the records furnished the Bureau by the company.

Contest rules and application forms may be obtained by a written request to the Accident Analysis Branch, Bureau of Mines, Washington 25, D. C., or from the following regional offices of the Bureau: Region II, Albany, Oregon; Region III, San Francisco California; Region IV, Denver, Colorado; Region V, Minneapolis, Minnesota; Region VI, Amarillo, Texas; Region VII, Norris, Tennessee; and Region VIII, Pittsburgh, Pennsylvania.

THE MINE PORTAL: A view of the portal at the Short Creek bituminous-coal mine of Tennessee Coal and Iron Division, United States Steel Corporation.

Anthracite Underground Mines

The Hunter Tunnel mine of The Philadelphia and Reading Coal and Iron Company at Ashland, Schuylkill County, Pennsylvania, in the western middle field, won the top safety honor in the anthracite underground-mine group. The winning record was a perfect one – no lost-time injuries during 77,336 man-hours of worktime in 1952. The award of the Sentinels of Safety trophy in the 1952 contest is the second time the Hunter Tunnel mine has won it in its seven years of participation in the National Safety Competition. In 1946, the first year it was enrolled in the contest, Hunter Tunnel mine was awarded a Certificate of Achievement in Safety for attaining second place in the anthracite underground group. In 1948, it was awarded the Sentinels of Safety trophy for an injury-free record during a worktime of 127,974 man-hours in that year. During the seven years this mine has competed with other anthracite operations, 733,019 man-hours have been worked. The 17 lost-time injuries at this operation dur-ng that period occurred at a frequency rate of 23.2 per million man-hours, and an injury-severity rate of 9.65 days per thousand man-hours worked.

Fifty-one mines were enrolled in the anthracite group, two more than in 1951. These mines, however, worked 9 per cent fewer man-hours than in the previous year. However, because of a 10 per cent decrease in the number of injuries, the injury-frequency rate dropped from 82.312 in 1951 to 81.591 in 1952, the lowest rate figure since 1941. The severity rate was lowered slightly in 1952.

Bituminous-Coal Underground Mines

The best safety record in the bituminous-coal group was made by the

VICTORIOUS BUCK MINERS: These men worked underground in the Buck mine, Caspian, Michigan, 685,388 man-hours in 1952 without a lost-time injury. As a result, this operation of The Verona Mining Company, Pickands Mather & Company, won the Sentinels of Safety trophy.

Short Creek mine of Tennessee Coal and Iron Division, U. S. Steel Corporation, located at Adamsville, Jefferson County, Alabama. The bronze trophy was awarded to this mine for having had a perfect record of no lost-time injuries in 588,788 man-hours of work during 1952. For the first time since 1947, a bituminous-coal underground mine succeeded in wresting first place in this classification from The Union Pacific Coal Company's Reliance No. 7 mine at Reliance, Sweetwater County, Wyoming. The Reliance mine won the trophy in 1951 for the fourth consecutive year, after the company's Winton No. 1 and 7½ mine had won it in 1947.

The bituminous-coal underground mine group worked 65,470,100 man-hours in 1952, a decrease of 21 per cent. The number of mines enrolled showed a decrease of 4 per cent. Record low rates were established in the frequency of occurrence and severity of injuries, the former dropping from 23.256 to 22.697 injuries per million man-hours, and the latter decreasing from 5.850 to 5.688 days per thousand man-hours. These new low record rates brought about a 3 per cent reduction in the all-time frequency rate, and a reduction of 2.8 per cent in the severity rate for the 28-year history of the competition.

BUCK MINE SUPERVISORS: Seated, H. J. Richards, general superintendent; standing, left to right, A. A. Martini, underground superintendent; A. J. Lindblom, head mine captain; H. Ford, assistant mine captain; S. Fodor, chief master mechanic; M. Choquette, mine captain.

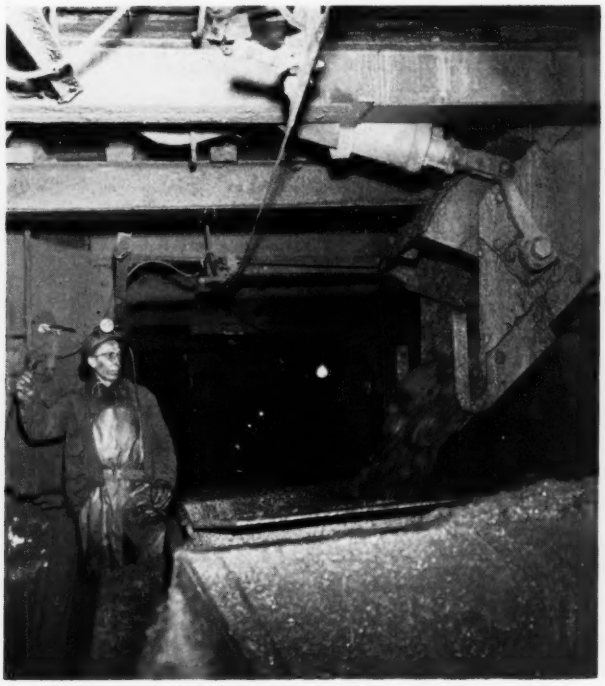
Metal Underground Mines

The Buck mine of The Verona Mining Company, Pickands Mather and Company, located at Caspian, Iron County, Michigan, won the trophy in the metal underground mine group. This mine was operated throughout 1952 without a disabling injury, during a worktime of 685,388 man-hours. It became a competitor for national safety honors in 1930 and, since that time, has recorded outstanding safety performances. In 1939, it received honorable mention for an injury-free year. Its injury-severity rates have been consistently better than the average for the entire industry. It is a tribute to the persistent efforts of the employes and the supervisors in practicing safety at this property that the mine won the 1952 top award in this division of the contest. The employes have earned sincere congratulations for their perfect safety record in 1952, and for their long and earnest efforts to attain this goal. Since entering the competition in 1930, this metal mine has been worked 9,473,749 man-hours. From that year through the current year, the frequency rate has been 19.11 for injuries, with an accompanying severity rate of 5.00 days lost per million and per thousand man-hours, respectively.

SAFETY COMMITTEE: Buck mine's safety committee comprises, front row, left to right, F. Nordling; L. A. Schutz, safety director; J. Rashberger; back row, left to right, H. Peterson; C. Michelson; H. Pierantoni; T. Drake.

The total number of participants in the metal-mine group – 62 – was a record enrollment, exceeding by eight the number enrolled in the 1951 contest. As a group, the injury-frequency and injury-severity rates were not so favorable as in 1951. Sporadic recessions in safety records at metal plants have occurred in the past, but recov-

THE BERKSHIRE SHAFT: A view of the Berkshire shaft at the Buck mine, a Pickands Mather & Company property at Caspian, Iron County, Michigan. The mound of material at left center is a stock pile of ore from the mine.



LOADING CHUTE: In the Buck mine, Dominic Demici handles the controls of the air-operated loading chute designed by the mine's general superintendent, H. J. Richards.

LOOSENING ORE: Using a compressed air hose in Verona Mining Company's Buck mine, Caspian, Michigan, trammer Stanley Bors loosens ore in the chute carrying it to the scraping tub.

ANNANDALE MINERS: Workmen at the Annandale, Boyers, Pennsylvania, mine of Michigan Limestone Division, U. S. Steel Corporation, had the best safety record in the 1952 competition in the underground nonmetallic mine group.

eries have been instant and consistent.

Nonmetallic Underground Mines

The top award for the best safety record in the nonmetallic underground-mine group goes to the Annandale limestone mine of the Michigan Limestone Division, United States Steel Corporation, located at Boyers, Butler County, Pennsylvania. In 1952, this plant was worked 746,135 man-hours without a lost-time injury. During the two years it has been enrolled in the competition, only one lost-time injury has been recorded, resulting in a loss of 12 days during a total work-time of 1,653,303 man-hours. The injury-frequency rate during this period was 0.605 injury per million man-hours and the severity rate 0.007 day lost per thousand man-hours worked. Such a creditable performance is the result of the constant, wholehearted cooperation of all employes in working safely at all times.

In this group, 47 mines were enrolled in the 1952 competition, one fewer than in 1951. These plants were worked for a total of more than 9½ million man-hours. They recorded an injury-frequency rate of 20.514 and a severity rate of 1.859, each considerably lower than the respective 1951 rates of 26.093 and 3.998. The frequency rate was the lowest since 1940, and the severity rate was the lowest since the 1938 competition.

Open-Pit Mines

The winner of the bronze Sentinels of Safety trophy for having had the best safety record among the open-pit mines enrolled in the competition was the Noralyn mine of International Minerals and Chemical Corporation,

ANNANDALE'S SAFETY COMMITTEE: Left to right, Andrew Guerin, plant foreman; Max Scott, mining engineer; John McGallis, drill helper; Vencient Panei, track gang leader; Raffale Colosimo, locomotive engineer; Glen Sweetapple, assistant mine foreman.

MECHANIZED MINING: A loading machine in Annandale mine, operated by Philip Labor, excavates blasted limestone and loads it into a shuttle car in the rear, operated by Blardino Chelli.

UNDERGROUND AT ANNANDALE: Arthur Lynch, operating an electric shovel, loads blasted limestone into a mine car in one of the 12 by 30-ft. rooms in the Annandale limestone mine, Boyers, Pennsylvania.

at Bartow, Polk County, Florida. Its winning record was a perfect one, with 715,588 man-hours of exposure to hazards without a disabling injury. This mine was first enrolled in the 1951 competition. Its 1951 record indicates it was operated 684,481 man-hours with one disabling injury, accounting for a loss of 121 days. For the two-year period, it has been worked 1,400,069 man-hours with an injury-frequency rate of 0.714 and an injury-severity rate of 0.086.

With 90 open-pit operations entered in the 1952 contest, an all-time record enrollment was established for this classification. As a group, these plants were operated over 21½ million man-hours and concluded the year with an injury-frequency rate of 13.143, the lowest rate of the six groups, and a severity rate of 2.633. Although the rates were higher than in 1951, they were considerably lower than the average rates for the 28-year period of the National Safety Competition.

Quarries

The Hillsville limestone quarry of the Michigan Limestone Division, United States Steel Corporation, at Hillsville, Lawrence County, Pennsylvania, with an injury-free record during 452,548 man-hours of work, won the Sentinels of Safety trophy for the best safety record in the quarry group. This is the second year that the Hillsville quarry has been enrolled in the contest. During 1951, it was worked

ANNANDALE'S SUPERVISORS: Left to right, G. A. Sweetapple, assistant mine foreman; R. H. Kerr, master mechanic; L. L. Kohlmeyer, assistant mine foreman; A. S. Wiland, chief clerk; L. E. Hooks, chief electrician; J. W. Baird, manager; C. W. Wolford, mine foreman; M. M. Scott, plant engineer; A. J. Guerin, plant foreman.

538,776 man-hours and had one disabling injury which resulted in a time loss of 38 days. Thus, for the two-year period the frequency rate per million man-hours was 1.01 and the severity rate 0.038, both rates well below the average for the industry.

As a group, the 219 quarries competing in the 1952 contest had more favorable injury rates than in 1951. The injury-frequency rate of 13.392 per million man-hours was 7 per cent lower, and the injury-severity rate of 4.049 was 14 per cent lower than the corresponding rates of the previous year. Also, both rates were considerably lower than their respective 28-year averages of 20.340 and 4.577.

Perfect Safety Records

Perfect records of operating through 1952 without a lost-time injury were made by 186 mines and quarries. This represented 30.8 per cent of the total number of operations enrolled in the contest. These injury-free plants were operated for a total of 20,945,406 man-hours in 1952, thus establishing new all-time records for the greatest number of injury-free operations and the largest volume of injury-free worktime in the history of the National Safety Competition. Perfect records were achieved in the following groups: anthracite, 5; bituminous-coal, 11; metal, 9; nonmetallic, 16; open-pit, 34; quarry, 111. The quarry group, with 50.7 per cent of its enrollment injury-free, led all other groups in unit achievement; the open-pit group, with 37.8 per cent, was second; the nonmetallic group, with 34.0 per cent, was third; and the metal, anthracite, and bituminous-coal groups ranked in that

DIVISION SAFETY COMMITTEE: Success crowned the efforts of (front, left to right) W. E. Moody, W. J. McNally, J. M. Duba. Rear, left to right, H. L. Phillips, L. W. Hancock, J. L. Branch, M. C. Riley, C. M. Ellis.

NORALYN PLANT: An aerial view of the Noralyn processing operations shows the washer and flotation buildings in the rear, the wet rock storage area and dryers in the center, and the storage silos and shipping facilities in the foreground.

NORALYN MINERS: A group of workmen and supervisors at International Minerals & Chemical Corporation's Noralyn mine, Bartow, Florida, the winner in the open-pit mine group in the 1952 competition.

order with 14.5, 9.8, and 8.2 per cent.

Included in the 186 injury-free operations were 35 properties, each of which was worked fewer than 30,000 man-hours, the minimum requirement for consideration in the trophy and certificate awards. However, the employes and supervisors at these operations deserve high praise for their outstanding safety records. Many of these properties have been enrolled in the contest year after year with the realization of their ineligibility for receiving awards. They entered the competition and remained in it because of their belief that organized effort in injury-prevention work would benefit them individually, and aid the minerals industry as a whole in the promotion of safety. These operations were as follows:

NORALYN'S SUPERVISORS: Front, left to right, J. L. Robison, assistant mining superintendent; A. A. Waugh, safety supervisor; I. S. Tillotson, mining superintendent; rear, left to right, A. E. Norman, float gang foreman; J. O. Fraiser, mine shift foreman; J. D. McDuffie, mine shift foreman; M. T. Smith, Sr., assistant mining superintendent; T. M. Norman, mine shift foreman.

ANTHRACITE MINES

Ontario Drift No. 1 mine, Blakely, Lackawanna County, Pennsylvania, operated by Frank Lehman Company, worked 11,851 man-hours without a disabling injury.

John Jones mine, Mahanoy City, Schuylkill County, Pennsylvania, operated by John Jones Coal Company, worked 7,210 man-hours without a disabling injury.

Mahanoy City mine, Mahanoy City, Schuylkill County, Pennsylvania, operated by Skytop Coal Company, Incorporated, worked 2,366 man-hours without a disabling injury.

Trevorton mine, Trevorton, Northumberland County, Pennsylvania, operated by Konyar Coal Company, worked 420 man-hours without a disabling injury.

BITUMINOUS-COAL MINES

Drift No. 21 mine, Dawson Springs, Hopkins County, Kentucky, operated by The United Electric Coal Companies, worked 22,829 man-hours without a disabling injury.

Rockhill No. 1 mine, Robertsdale, Huntingdon County, Pennsylvania, operated by Rockhill Coal Company, worked 22,320 man-hours without a disabling injury.

Central mine, Brockport, Elk County, Pennsylvania, operated by Northwestern Mining & Exchange Company, worked 15,292 man-hours without a disabling injury.

RECOVERING THE ORE: After stripping the overburden, phosphate ore, called "matrix," is recovered by a Bucyrus-Erie, 1150 B electrically operated walking dragline with a 21.4-cu. yd. bucket.

Seymour mine, Morris Run, Tioga County, Pennsylvania, operated by Morris Run Coal Company, worked 4,970 man-hours without a disabling injury.

NONMETALLIC MINES

Hannibal limestone mine, Hannibal, Marion County, Missouri, operated by Marblehead Lime Company, worked 29,376 man-hours without a disabling injury.

Marblehead limestone mine, Marblehead, Adams County, Illinois, operated by Marblehead Lime Company, worked 19,524 man-hours without a disabling injury.

Claymont shale and clay mine, Corona, Riverside County, California, operated by Gladding, McBean & Company, worked 16,801 man-hours without a disabling injury.

Hanover gypsum mine, Hanover, Fergus County, Montana, operated by Ideal Cement Company, worked 15,736 man-hours without a disabling injury.

HYDRAULIC TREATMENT: After the matrix is dumped into piles on the ground, hydraulic guns shoot water under enormous pressure upon the ore and convert it into slime, called "slurry."

OPEN-PIT MINES

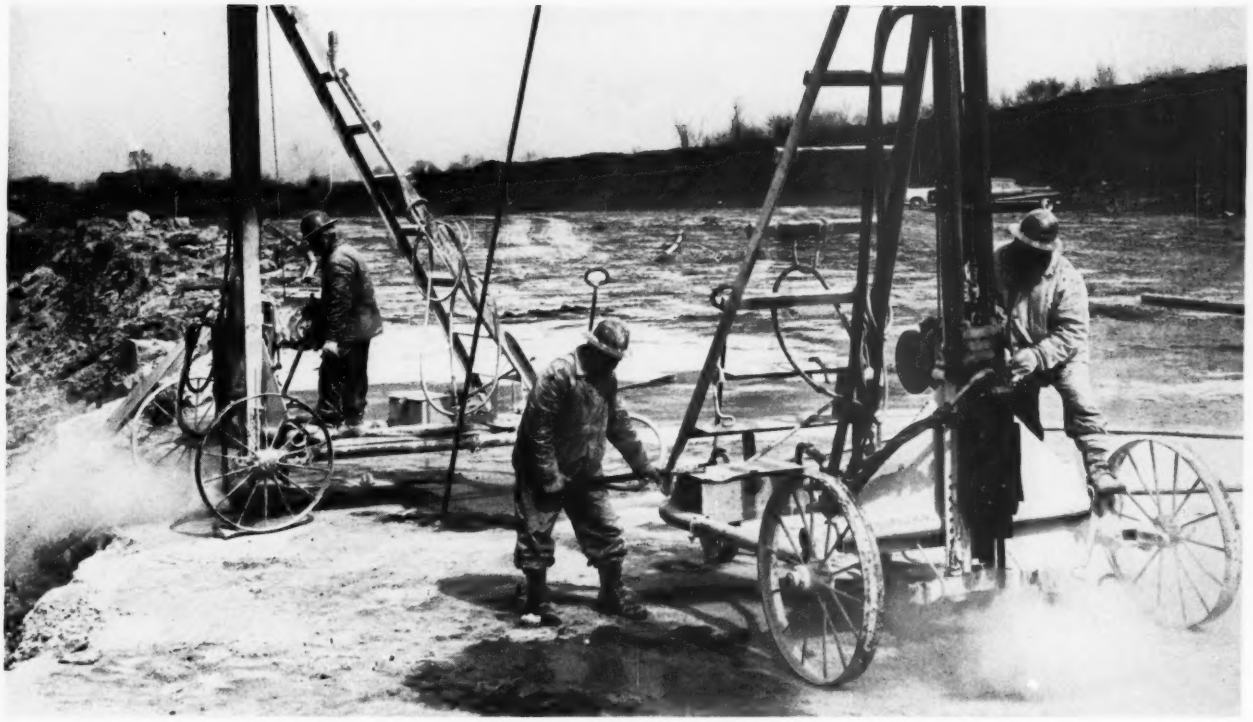
Cornell iron-ore mine, Iron Mountain, Dickinson County, Michigan, operated by Globe Iron Company, worked 28,538 man-hours without a disabling injury.

Chatteaugay iron-ore mine, Lyon Mountain, Clinton County, New York, operated by Republic Steel Corporation, worked 18,000 man-hours without a disabling injury.

Page open-pit bituminous-coal mine, Page, Fayette County, West Virginia, operated by Eastern Gas & Fuel Associates, worked 16,008 man-hours without a disabling injury.

Wade iron-ore mine, Buhl, St. Louis County, Minnesota, operated by Pickands Mather & Company (Utica Mining Company), worked 12,775 man-hours without a disabling injury.

Monitor extension stripping anthracite mine, Locust Gap, Northumberland County, Pennsylvania, operated by The Philadelphia & Reading Coal & Iron Company, worked 12,439 man-hours without a disabling injury.



DRILLING — HILLSVILLE QUARRY: On top of a working face in the Hillsville, Pennsylvania, limestone quarry of the Michigan Limestone Division, United States Steel Corporation, Sam Pazzuoli, left, and Rocco Mittica, right, operate one of the wagon drills while Guiseppe Gennaro picks up a bit-changing tool.

QUARRIES

Maryneal limestone quarry, Maryneal, Nolan County, Texas, operated by Lone Star Cement Corporation, worked 27,792 man-hours without a disabling injury.

Leap No. 1 ganister rock quarry, Madley, Bedford County, Pennsylvania, operated by Leap Ganister Rock Company, worked 25,-633 man-hours without a disabling injury.

Butlerville crushed stone and agricultural lime quarry, Butlerville, Jennings County, Indiana, Muscatatuck State School, worked 25,040 man-hours without a disabling injury.

Georgetown limestone quarry, Georgetown, Harrison County, Ohio, operated by Hanna Coal Company Division of the Pittsburgh Consolidation Coal Company, worked 23,576 man-hours without a disabling injury.

Denmark limestone quarry, Denmark, Lee County, Iowa, operated by Raid Brothers Construction Company, worked 23,100 man-hours without a disabling injury.

Nelson lime and limestone quarry, Nelson, Yavapai County, Arizona, operated by Grand Canyon Lime and Cement Company, worked 22,688 man-hours without a disabling injury.

San Antonio limestone quarry, San Antonio, Bexar County, Texas, operated by Longhorn Portland Cement Company, worked 20,961 man-hours without a disabling injury.

Douds limesone quarry, Douds, Van Buren County, Iowa, operated by Raid Brothers Construction Company, worked 20,000 man-hours without a disabling injury.

Milltown lime quarry, Milltown, Harrison County, Indiana, operated by Louisville Cement Company, worked 19,011 man-hours without a disabling injury.

IN THE QUARRY: Rudy Onasch, operating a Bucyrus-Erie electric shovel with a 5-cu. yd. dipper, recovers blasted limestone in the quarry of Michigan Limestone Division, U. S. Steel Corporation, at Hillsville, Pennsylvania.

HILLSVILLE PLANT: Limestone from the quarry is washed and screened in the building above, and shipped to U. S. Steel's blast furnaces. The sign in the foreground proudly proclaims no lost-time injuries among the 250 employes at the quarry during the last 189 days.

Manitowoc limestone quarry, Manitowoc, Manitowoc County, Wisconsin, operated by Rockwell Lime Company, worked 16,698 man-hours without a disabling injury.

Billmeyer No. 2 crushed stone quarry, Mt. Wolf, York County, Pennsylvania, operated by The J. E. Baker Company, worked 10,544 man-hours without a disabling injury.

Frederick limestone quarry, Frederick, Frederick County, Maryland, operated by Shank & Etzler Lime Company, worked 9,500 man-hours without a disabling injury.

Montebello decomposed granite quarry, Montebello, Los Angeles County, California, operated by L. A. Decomposed Granite Company, worked 8,950 man-hours without a disabling injury.

Farm Bureau Co-op agricultural limestone quarry, Latham, Pike County, Ohio, operated by L. M. Gleason & Son, worked 8,520 man-hours without a disabling injury.

Birmingham crushed shale quarry, Birmingham, Jefferson County, Alabama, operated by Lone Star Cement Corporation, worked 8,120 man-hours without a disabling injury.

Pierce County basalt riprap quarry, Orting, Pierce County, Washington, operated by Pierce County River Improvement Company, worked 4,160 man-hours without a disabling injury.

Eureka hydrated lime quarry, Eureka, Juab County, Utah, operated by Lime Products Division of the Chief Consolidated Mining Company, worked 2,912 man-hours without a disabling injury.

Feller agricultural lime quarry, Verona, Dane County, Wisconsin, operated by Alva Brumm Company, worked 2,400 man-hours without a disabling injury.

SCOPE OF THE COMPETITION

The nation-wide interest in the National Safety Competition of 1952 is indicated by the enrollment of 603 mines and quarries located in 40 states. The following table shows the number of properties enrolled in each state:

State	Properties Enrolled
Alabama	18
Arizona	4
Arkansas	4
California	14
Colorado	14
Connecticut	3
Florida	5
Georgia	7
Illinois	15
Indiana	9
Iowa	8
Kansas	6
Kentucky	21
Louisiana	2
Maine	1
Maryland	5
Massachusetts	5
Michigan	38
Minnesota	52
Missouri	12
Montana	2
Nebraska	1
New Jersey	7
New Mexico	1
New York	29
Nevada	4
North Carolina	2
North Dakota	2
Ohio	29
Oklahoma	2
Pennsylvania	160
South Dakota	1
Tennessee	14
Texas	12
Utah	11
Virginia	15
Washington	5
West Virginia	45
Wisconsin	6
Wyoming	12

Of the 603 plants tabulated above, 36.3 per cent are quarries; 22.2 per cent are bituminous-coal mines; 14.9 per cent are open-pit mines; 10.3 per cent are metal mines; 8.5 per cent are anthracite mines; and 7.8 per cent are nonmetallic mines.

ALL-TIME WINNERS

ANTHRACITE

1925—Hazle Brook Coal Company, *Upper Lehigh Mine*, Upper Lehigh, Pa.
1926—Jeddo-Highland Coal Company, *Highland No. 6 Mine*, Jeddo, Pa.
1927—Jeddo-Highland Coal Company, *Highland No. 6 Mine*, Jeddo, Pa.
1928—Jeddo-Highland Coal Company, *Highland No. 7 Mine*, Jeddo, Pa.
1929—Jeddo-Highland Coal Company, *Highland No. 6 Mine*, Jeddo, Pa.
1930—Coxe Brothers & Company, Inc., *Tomhicken Mine*, Jeddo, Pa.
1931—Jeddo-Highland Coal Company, *Highland No. 2 Mine*, Jeddo, Pa.
1932—Jeddo-Highland Coal Company, *Highland No. 7 Mine*, Jeddo, Pa.
1933—The Hudson Coal Company, *Stillwater Mine*, Vandling, Pa.
1934—Harleigh-Brookwood Coal Company, *Laurence Mine*, Mahanoy Plane, Pa.
1935—Jeddo-Highland Coal Company, *Jeddo No. 7 Mine*, Harleigh, Pa.
1936—Hazle Brook Coal Company, *Raven Run Mine*, Raven Run, Pa.
1937—Jeddo-Highland Coal Company, *Jeddo No. 7 Mine*, Harleigh, Pa.
1938—Colonial Colliery Company, *Greenough Mine*, Natalie, Pa.
1939—The Hudson Coal Company, *Eddy Creek Mine*, Olyphant, Pa.
1940—Hazle Brook Coal Company, *Midvalley Mine*, Wilburton, Pa.
1941—Eddie & Joe Coal Company, *Eddie & Joe Mine*, Simpson, Pa.
1942—Jeddo-Highland Coal Company, *Stockton Mine*, Stockton, Pa.
1943—Morgan Coal Company, *Oregon Slope Mine*, Pittston, Pa.
1944—The Hudson Coal Company, *Miles Slope Mine*, Dickson City, Pa.
1945—Jermyn-Green Coal Company, *Butler Mine*, Pittston, Pa.
1946—Jermyn-Green Coal Company, *Butler Mine*, Pittston, Pa.
1947—Jermyn-Green Coal Company, *Butler Mine*, Pittston, Pa.
1948—Philadelphia and Reading Coal and Iron Company, *Hunter Tunnel Mine*, Ashland, Pa.
1949—Kehoe-Berge Coal Company, *Stevens Shaft Mine*, Exeter, Pa.
1950—The Hudson Coal Company, *Birdseye Mine*, Throop, Pa.
1951—Ploskonka Coal Company, *No. 5 Hill Mine*, Archbald, Pa.
1952—Philadelphia and Reading Coal and Iron Company, *Hunter Tunnel Mine*, Ashland, Pa.

BITUMINOUS-COAL

1925—United States Coal and Coke Company, *No. 6 Mine*, Gary, W. Va.
1926—United States Coal and Coke Company, *No. 6 Mine*, Gary, W. Va.
1927—United States Coal and Coke Company, *No. 2 Mine*, Gary, W. Va.
1928—United States Coal and Coke Company, *No. 4 Mine*, Gary, W. Va.
1929—DeBardeleben Coal Corporation, *Hull No. 33 Mine*, Dora, Ala.
1930—Penn Central Light and Power Company, *No. 1 Mine*, Coalmont, Pa.
1931—Phelps-Dodge Corporation, *Dawson No. 1 Mine*, Dawson, N. Mex.
1932—Electro Metallurgical Company, Alloy, W. Va.
1933—The Union Pacific Coal Company, *"B" Mine*, Superior, Wyo.
1934—The Union Pacific Coal Company, *"C" Mine*, Superior, Wyo.
1935—Elkhorn Piney Coal Company, *Ingram Branch Mine*, Ingram Branch, W. Va.
1936—The Koppers Coal Company, *Coxton Mine*, Coxton, Ky.
1937—The Union Pacific Coal Company, *"D" Mine*, Superior, Wyo.
1938—The Union Pacific Coal Company, *"B" Mine*, Superior, Wyo.
1939—The Union Pacific Coal Company, *Winton No. 1 Mine*, Winton, Wyo.
1940—The Union Pacific Coal Company, *Rock Springs No. 4 Mine*, Rock Springs, Wyo.
1941—Electro Metallurgical Company, *Alloy No. 2 Mine*, Alloy, W.Va.
1942—Knife River Coal Company, *Knife River Mine*, Beulah, N. Dak.
1943—The Union Pacific Coal Company, *"D" Mine*, Superior, Wyo.
1944—The Union Pacific Coal Company, *"D" Mine*, Superior, Wyo.
1945—Rockhill Coal Company, *Rockhill No. 5 Mine*, Robertsdale, Pa.
1946—Consolidated Coal Company, *Bankhead No. 2 Mine*, Bankhead, Ala.
1947—The Union Pacific Coal Company, *Winton No. 1 and 7½ Mine*, Winton, Wyo.
1948—The Union Pacific Coal Company, *Reliance No. 7 Mine*, Reliance, Wyo.
1949—The Union Pacific Coal Company, *Reliance No. 7 Mine*, Reliance, Wyo.
1950—The Union Pacific Coal Company, *Reliance No. 7 Mine*, Reliance, Wyo.
1951—The Union Pacific Coal Company, *Reliance No. 7 Mine*, Reliance, Wyo.
1952—Tennessee Coal and Iron Division, United States Steel Corporation, *Short Creek Mine*, Adamsville, Ala.

METAL

1925—New York Mining Company, *New York Mine (zinc and lead)*, Picher, Okla.
1926—Federal Mining and Smelting Company, *Muncie Mine (zinc and lead)*, Baxter Springs, Kans.
1927—The Bristol Mining Company, *Bristol Mine (iron)*, Crystal Falls, Mich.
1928—Brule Mining Company, *Berkshire Mine (iron)*, Stambaugh, Mich.
1929—Brule Mining Company, *Berkshire Mine (iron)*, Stambaugh, Mich.
1930—Penn Iron Mining Company, *West Vulcan Mine*, Vulcan, Mich.
1931—Hanna Ore Mining Company, *Harold Mine*, Carson Lake, Minn.
1932—St. Joseph Lead Company, *Balmat Mine (lead, zinc, and pyrites)*, Balmat, N. Y.
1933—Tennessee Copper Company, *Burra Burra Mine*, Ducktown, Tenn.
1934—Penn Iron Mining Company, *East Vulcan Mine*, Vulcan, Mich.
1935—Vermillion Mining Company, *Zenith Mine (iron)*, Ely, Minn.
1936—Penn Iron Mining Company, *East Vulcan Mine*, Vulcan, Mich.
1937—M. A. Hanna Company, *Hiawatha No. 1 Mine (iron)*, Iron River, Mich.
1938—Odanah Iron Company, *Cary Mine (iron)*, Hurley, Wis.
1939—M. A. Hanna Company, *Bates Mine (iron)*, Iron River, Mich.
1940—Phelps-Dodge Corporation, *Humboldt Mine*, Morenci, Ariz.
1941—American Zinc Company of Tennessee, *Grasselli Mine (zinc sulphide)*, New Market, Tenn.
1942—Tennessee Copper Company, *Boyd Mine*, Ducktown, Tenn.
1943—Penn Iron Mining Company, *East Vulcan Mine*, Vulcan, Mich.
1944—Youngstown Mines Corporation, *Newport Mine (iron)*, Ironwood, Mich.
1945—James Mining Company, *James Mine (iron)*, Iron River, Mich.
1946—Tennessee Copper Company, *Burra Burra Copper Mine*, Ducktown, Tenn.
1947—Oliver Iron Mining Company, *Soudan Mine*, Soudan, Minn.
1948—Oliver Iron Mining Company, *Fraser Mine*, Fraser, Minn.
1949—American Zinc Company of Tennessee, *No. 2 Mine*, Mascot, Tenn.
1950—Republic Steel Corporation, *Tobin Mine*, Crystal Falls, Mich.
1951—Oliver Iron Mining Company, *Soudan Mine*, Soudan, Minn.
1952—The Verona Mining Company, Pickands Mather & Company, *Buck Mine*, Caspian, Mich.

NONMETALLIC

1925—United States Gypsum Company, *Lower Gypsum Mine*, Gypsum, Ohio.
1926—The Beaver Products Company, Inc., *Grand Rapids Mine (gypsum)*, Grand Rapids, Mich.
1927—The Marquette Cement Manufacturing Company, *La Salle Mine (limestone)*, Oglesby, Ill.
1928—Alpha Portland Cement Company, *Ironton Mine (limestone)*, Ironton, Ohio.
1929—Retsof Mining Company, *Retsof Mine (rock salt)*, Retsof, N. Y.
1930—United States Gypsum Company, *Lower Gypsum Mine*, Gypsum, Ohio.
1931—Retsof Mining Company, *Retsof Mine (rock salt)*, Retsof, N. Y.
1932—Retsof Mining Company, *Retsof Mine (rock salt)*, Retsof, N. Y.
1933—Retsof Mining Company, *Retsof Mine (rock salt)*, Retsof, N. Y.
1934—The Marquette Cement Manufacturing Company, *La Salle Mine (limestone)*, Oglesby, Ill.
1935—Certain-teed Products Corporation, *Gypsum Mine*, Akron, N. Y.
1936—Tennessee Coal, Iron & Railroad Company, *No. 5 Mine (limestone)*, *Bessemer, Ala.*
1937—Tennessee Coal, Iron & Railroad Company, *No. 5 Mine (limestone)*, Bessemer, Ala.
1938—Avery Salt Company, Avery Island, La.
1939—Tennessee Coal, Iron & Railroad Company, *No. 5 Mine (limestone)*, Bessemer, Ala.
1940—Tennessee Coal, Iron & Railroad Company, *No. 5 Mine (limestone)*, Bessemer, Ala.
1941—United States Gypsum Company, *No. 6 Mine (gypsum)*, Plasterco, Va.

1942—Alpha Portland Cement Company, *Ironton Mine (limestone)*, Ironton, Ohio.

1943—United States Gypsum Company, *No. 6 Mine (gypsum)*, Plasterco, Va.

1944—National Gypsum Company, *Akron Gypsum Mine*, Akron, N. Y.

1945—Freeport Brick Company, *Freeport Mine (clay)*, Freeport, Pa.

1946—Certain-teed Products Corporation, *Acme Gypsum Mine*, Acme, Texas.

1947—Tennessee Coal, Iron & Railroad Company, *No. 5 Mine (limestone)*, Bessemer, Ala.

1948—Alpha Portland Cement Company, *Ironton Mine*, Ironton, Ohio.

1949—National Gypsum Company, *Bellefonte Mine*, Bellefonte, Pa.

1950—Pittsburgh Plate Glass Company, *Barberton Limestone Mine*, Barberton, Ohio.

1951—International Salt Company, *Retsof Mine*, Retsof, N. Y.

1952—Michigan Limestone Division, United States Steel Corporation, *Annandale Mine (limestone)*, Boyers, Pa.

OPEN-PIT AND QUARRIES

1925—North American Cement Corporation, *Security Quarry (limestone)*, Security, Md.

1926—North American Cement Corporation, *No. 5 and 6 Quarry (limestone)*, Martinsburg, W. Va.

1927—Lehigh Portland Cement Company, *Mitchell Quarry (limestone)*, Mitchell, Ind.

1928—Wakefield Iron Company, *Wakefield Open-pit Mine (iron)*, Wakefield, Mich.

1929—Michigan Limestone & Chemical Company, *Rogers City Quarry (limestone)*, Rogers City, Mich.

1930—Plymouth Mining Company, *Plymouth Open-pit (iron)*, Wakefield, Mich.

1931—Mahoning Ore & Steel Company, *Mahoning Open-pit Mine (iron), Hibbing, Minn.*

1932—Michigan Limestone & Chemical Company, *Rogers City Quarry (limestone)*, Rogers City, Mich.

1933—Michigan Limestone & Chemical Company, *Rogers City Quarry (limestone)*, Rogers City, Mich.

1934—Michigan Limestone & Chemical Company, *Rogers City Quarry (limestone)*, Rogers City, Mich.

1935—Folsom State Prison, *Granite Quarry*, Folsom, Calif.

1936—Hanna Ore Mining Company, *Mesabi Chief Mine (iron)*, Keewatin, Minn.

1937—Illinois State Penitentiary, *Limestone Quarry*, Menard, Ill. (Separated into Individual Groups in 1938.)

OPEN-PIT

1938—Pickands Mather & Company, *Mahoning Mine (iron-ore)*, Hibbing, Minn.

1939—Pickands Mather & Company, *Scranton Mine (iron-ore)*, Hibbing, Minn.

1940—Pickands Mather & Company, *Mahoning Mine (iron-ore)*, Hibbing, Minn.

1941—Pickands Mather & Company, *Mahoning Mine (iron-ore)*, Hibbing, Minn.

1942—Pickands Mather & Company, *Mahoning Mine*, Hibbing, Minn.

1943—Pickands Mather & Company, *Danube Mine*, Bovey, Minn.

1944—Pickands Mather & Company, *Danube Mine*, Bovey, Minn.

1945—Pickands Mather & Company, *Mahoning Mine*, Hibbing, Minn.

1946—Oliver Iron Mining Company, *Rouchleau Iron-ore Pit*, Virginia, Minn.

1947—Pickands Mather & Company, *Mahoning Mine*, Hibbing, Minn.

1948—Oliver Iron Mining Company, *Spruce Open-cut Mine*, Eveleth, Minn.

1949—Pickands Mather & Company, *Embarrass Mine*, Biwabik, Minn.

1950—Pickands Mather & Company, *Embarrass Mine*, Biwabik, Minn.

1951—Oliver Iron Mining Company, *Mt. Iron Mine*, Mt. Iron, Minn.

1952—International Minerals and Chemical Corporation, *Noralyn Mine*, Bartow, Fla.

QUARRIES

1938—Inland Lime & Stone Company, *Port Inland Quarry (limestone)*, Manistique, Mich.

1939—Inland Lime & Stone Company, *Port Inland Quarry (limestone)*, Manistique, Mich.

1940—Tennessee Coal, Iron & Railroad Company, *Dolonah Quarry (dolomite)*, Bessemer, Ala.

1941—Tennessee Coal, Iron & Railroad Company, *Dolonah Quarry (dolomite)*, Bessemer, Ala.

1942—Bethlehem Steel Company, *Hanover Quarry*, Hanover, Pa.

1943—Wyandotte Chemicals Corporation, *Alpena Quarry*, Alpena, Mich.

1944—Basic Refractories, Inc., *Maple Grove Quarry (dolomite)*, Maple Grove, Ohio.

1945—Bethlehem Steel Company, *Bridgeport Quarry (limestone)*, Bridgeport, Pa.

1946—Bethlehem Steel Company, *Bridgeport Quarry (limestone)*, Bridgeport, Pa.

1947—Tennessee Coal, Iron & Railroad Company, *Dolonah Quarry (dolomite)*, Bessemer, Ala.

1948—Bethlehem Steel Company, *Hanover Quarry*, Hanover, Pa.

1949—Tennessee Coal, Iron & Railroad Company, *Dolonah Quarry (dolomite)*, Bessemer, Ala.

1950—Michigan Limestone & Chemical Company, *Rogers City Quarry (limestone)*, Rogers City, Mich.

1951—Inland Lime & Stone Company, *Port Inland Quarry (limestone)*, Gulliver, Mich.

1952—Michigan Limestone Division, United States Steel Corporation, *Hillsville Quarry (limestone)*, Hillsville, Pa.

Awards of Certificates of Achievement IN SAFETY

The rules of the competition provide for the award of Certificates of Achievement in Safety to each mine or quarry, other than the trophy winners, whose position in the contest was among the first four in their respective groups. Certificates are also awarded to each injury-free mine or quarry that worked 30,000 or more man-hours during the 12 consecutive months of each contest. The winners of Certificates of Achievement in Safety, in the National Safety Competition of 1952, are as follows:

ANTHRACITE MINES

Pittston mine, Pittston, Luzerne County, Pennsylvania, operated by P. & J. Coal Company, worked 51,093 man-hours with 2 disabling injuries that caused 13 days of disability. The injury-severity rate was 0.254.

Gravity Slope mine, Archbald, Lackawanna County, Pennsylvania, operated by The Hudson Coal Company, worked 170,359 man-hours with 8 disabling injuries that caused 57 days of disability. The injury-severity rate was 0.335.

No. 11 Slope mine, Exeter, Luzerne County, Pennsylvania, operated by Kehoe-Berge Coal Company, worked 48,986 man-hours with 4 disabling injuries that caused 32 days of disability. The injury-severity rate was 0.653.

Coal Brook mine, Carbondale, Lackawanna County, Pennsylvania, operated by The Hudson Coal Company, worked 277,590 man-hours with 15 disabling injuries that caused 249 days of disability. The injury-severity rate was 0.897.

BITUMINOUS-COAL MINES

No. 3 Seam Stansbury mine, Stansbury, Sweetwater County, Wyoming, operated by The Union Pacific Coal Company, worked 442,863 man-hours without a disabling injury.

Reliance No. 7 mine, Reliance, Sweetwater County, Wyoming, operated by The Union Pacific Coal Company, worked 370,738 man-hours without a disabling injury.

Freeport mine, Williamson, West Virginia, Pike County, Kentucky, operated by Pond Creek Colliery of the Norfolk and Western Railway Company, worked 237,608 man-hours without a disabling injury.

Thacker mine, Williamson, West Virginia, Pike County, Kentucky, operated by Pond Creek Colliery of the Norfolk and Western Railway Company, worked 193,936 man-hours without a disabling injury.

Karen mine, Fredericktown, Washington County, Pennsylvania, operated by United States Steel Corporation, worked 142,041 man-hours without a disabling injury.

Crested Butte mine, Crested Butte, Gunnison County, Colorado, operated by The

Colorado Fuel & Iron Corporation, worked 72,049 man-hours without a disabling injury.

METAL MINES

Fraser underground iron-ore mine, Fraser, St. Louis County, Minnesota, operated by Oliver Iron Mining Division of the United States Steel Corporation, worked 233,776 man-hours without a disabling injury.

Burra Burra copper-iron sulphide mine, Ducktown, Polk County, Tennessee, operated by Tennessee Copper Company, worked 216,719 man-hours without a disabling injury.

Sherwood iron-ore mine, Iron River, Iron County, Michigan, operated by Inland Steel Company, worked 193,775 man-hours without a disabling injury.

Calloway-Mary copper-iron sulphide mine, Ducktown, Polk County, Tennessee, operated by Tennessee Copper Company, worked 135,130 man-hours without a disabling injury.

Jarnagin zinc sulphide in dolomite limestone mine, Jefferson City, Jefferson County, Tennessee, operated by American Zinc Company of Tennessee, worked 121,387 man-hours without a disabling injury.

Cayia iron-ore mine, Crystal Falls, Iron County, Michigan, operated by Inland Steel Company, worked 91,561 man-hours without a disabling injury.

North Friends Station zinc sulphide in dolomite limestone mine, New Market, Jefferson County, Tennessee, operated by American Zinc Company of Tennessee, worked 52,933 man-hours without a disabling injury.

Athletic zinc sulphide in dolomite limestone mine, Jefferson City, Jefferson County, Tennessee, operated by American Zinc Company of Tennessee, worked 37,160 man-hours without a disabling injury.

NONMETALLIC MINES

Kaylor limestone mine, Kaylor, Armstrong County, Pennsylvania, operated by Michigan Limestone Division of the United States Steel Company, worked 427,210 man-hours without a disabling injury.

Buffalo Creek limestone mine, Worthington, Armstrong County, Pennsylvania, operated by Michigan Limestone Division of the United States Steel Corporation, worked 344,723 man-hours without a disabling injury.

Plant No. 9 limestone mine, West Winfield, Butler County, Pennsylvania, operated by Penn-Dixie Cement Corporation, worked 268,599 man-hours without a disabling injury.

Kimballton limestone mine, Kimballton, Giles County, Virginia, operated by National Gypsum Company, worked 183,461 man-hours without a disabling injury.

Bakerton stone and lime mine, Bakerton, Jefferson County, West Virginia, operated by The Standard Lime and Stone Company, worked 177,946 man-hours without a disabling injury.

Ironton limestone mine, Ironton, Lawrence County, Ohio, operated by Alpha Portland Cement Company, worked 143,590 man-hours without a disabling injury.

Jonathan limestone mine, East Fultonham, Muskingham County, Ohio, operated by Columbia Cement Division of the Pittsburgh Plate Glass Company, worked 111,247 man-hours without a disabling injury.

Manheim limestone mine, Manheim, Preston County, West Virginia, operated by Alpha Portland Cement Company, worked 92,487 man-hours without a disabling injury.

Crestmore limestone mine, Riverside, Riverside County, California, operated by Riverside Cement Company, worked 74,252 man-hours without a disabling injury.

Acme gypsum mine, Acme, Hardeman County, Texas, operated by Certain-teed Products Corporation, worked 44,451 man-hours without a disabling injury.

No. 3 cement rock and limestone mine, West Coplay, Lehigh County, Pennsylvania, operated by Coplay Cement Manufacturing Company, worked 30,600 man-hours without a disabling injury.

OPEN-PIT MINES

Embarrass iron-ore mine, Biwabik, St. Louis County, Minnesota, operated by Pickands Mather & Company (Lake Mining Company), worked 671,141 man-hours without a disabling injury.

Peace Valley phosphate mine, Bartow, Polk County, Florida, operated by International Minerals and Chemical Corporation, worked 340,460 man-hours without a disabling injury.

Hill Annex iron-ore mine, Calumet, Itasca County, Minnesota, operated by Minnesota Ore Division of the Jones & Laughlin Steel Corporation, worked 336,550 man-hours without a disabling injury.

Douglas iron-ore mine, Chisholm, St. Louis County, Minnesota, operated by The M. A. Hanna Company (Douglas Mining Company), worked 329,516 man-hours without a disabling injury.

Buckeye iron-ore mine, Coleraine, Itasca County, Minnesota, operated by The M. A. Hanna Company (Hanna Ore Mining Company), worked 294,994 man-hours without a disabling injury.

Hurricane Creek bauxite-ore mine, Alexander, Saline County, Arkansas, operated by Reynolds Mining Corporation, worked 276,420 man-hours without a disabling injury.

Corsica iron-ore mine, Elcor, St. Louis County, Minnesota, operated by Pickands Mather & Company (Corsica Iron Company), worked 242,510 man-hours without a disabling injury.

West Hill iron-ore mine, Grand Rapids, Itasca County, Minnesota, operated by Pickands Mather & Company (Cuyuna Ore Company), worked 222,099 man-hours without a disabling injury.

Mahnomen iron-ore mine, Crosby, Crow Wing County, Minnesota, operated by Pickands Mather & Company (Cuyuna Ore Company), worked 217,433 man-hours without a disabling injury.

Albany iron-ore mine, Hibbing, St. Louis County, Minnesota, operated by Pickands Mather & Company (Crete Mining Company), worked 195,518 man-hours without a disabling injury.

Gross-Marble iron-ore mine, Marble, Itasca County, Minnesota, operated by Oliver Iron Mining Division of the United States Steel Corporation, worked 170,209 man-hours without a disabling injury.

Sagamore iron-ore mine, Riverton, Crow Wing County, Minnesota, operated by Pickands Mather & Company (Sagamore Ore Mining Company), worked 167,425 man-hours without a disabling injury.

Plymouth iron-ore mine, Wakefield, Gogebic County, Michigan, operated by Pickands Mather & Company (Plymouth Mining Company), worked 142,879 man-hours without a disabling injury.

Longyear iron-ore mine, Hibbing, St. Louis County, Minnesota, operated by Minnesota Ore Division of the Jones & Laughlin Steel Corporation, worked 142,385 man-hours without a disabling injury.

Achan phosphate mine, Mulberry, Polk County, Florida, operated by International Minerals and Chemical Corporation, worked 133,478 man-hours without a disabling injury.

Arcturus iron-ore mine, Marble, Itasca County, Minnesota, operated by Oliver Iron Mining Division of the United States Steel Corporation, worked 130,254 man-hours without a disabling injury.

Columbia iron-ore mine, Virginia, St. Louis County, Minnesota, operated by Minnesota Ore Division of the Jones & Laughlin Steel Corporation, worked 127,268 man-hours without a disabling injury.

Enterprise iron-ore mine, Virginia, St. Louis County, Minnesota, operated by The M. A. Hanna Company (Hanna Ore Mining Company), worked 122,802 man-hours without a disabling injury.

Rabbit Lake iron-ore mine, Crosby, Crow Wing County, Minnesota, operated by Pickands Mather & Company (Youngstown Mines Corporation), worked 116,804 man-hours without a disabling injury.

Biwabik iron-ore mine, Biwabik, St. Louis County, Minnesota, operated by Pickands Mather & Company (Biwabik Mining Company), worked 114,840 man-hours without a disabling injury.

Wentworth iron-ore mine, Aurora, St. Louis County, Minnesota, operated by Minnesota Ore Division of the Jones & Laughlin Steel Corporation, worked 94,440 man-hours without a disabling injury.

Columbia phosphate mine, Columbia, Maury County, Tennessee, operated by Monsanto Chemical Company, worked 93,977 man-hours without a disabling injury.

Fayal iron-ore mine, Eveleth, St. Louis County, Minnesota, operated by Oliver Iron Mining Division of the United States Steel Corporation, worked 80,109 man-hours without a disabling injury.

Erie Preliminary Taconite Plant open-pit iron-ore mine, Aurora, St. Louis County, Minnesota, operated by Pickands Mather & Company (Erie Mining Company), worked 78,556 man-hours without a disabling injury.

Klondyke kaolin mine, McIntyre, Wilkinson County, Georgia, operated by Edgar Brothers Company, worked 67,924 man-hours without a disabling injury.

Richmond iron-ore mine, Palmer, Marquette County, Michigan, operated by Richmond Iron Company (The M. A. Hanna Company), worked 45,687 man-hours without a disabling injury.

Gerhardt pyrophyllite mine, Staley, Randolph County, North Carolina, operated by Carolina Pyrophyllite Company, worked 38,376 man-hours without a disabling injury.

Beulah open-pit bituminous-coal mine, Beulah, Mercer County, North Dakota, operated by Knife River Coal Mining Company, worked 35,455 man-hours without a disabling injury.

QUARRIES

Bridgeport limestone quarry, Bridgeport, Montgomery County, Pennsylvania, operated by Bethlehem Steel Company, worked 347,213 man-hours without a disabling injury.

Hanover limestone quarry, Hanover, York County, Pennsylvania, operated by Bethlehem Steel Company, worked 229,049 man-hours without a disabling injury.

Moler dolomite quarry, Millville, Jefferson County, West Virginia, operated by Michigan Limestone Division of the United States Steel Corporation, worked 202,239 man-hours without a disabling injury.

Plant No. 4 argillaceous limestone quarry, Nazareth, Northampton County, Pennsylvania, operated by Penn-Dixie Cement Corporation, worked 180,999 man-hours without a disabling injury.

Bailey Falls limestone quarry, Oglesby, LaSalle County, Illinois, operated by Marquette Cement Manufacturing Company, worked 178,106 man-hours without a disabling injury.

Security limestone quarry, Hagerstown, Washington County, Maryland, operated by North American Cement Corporation, worked 169,133 man-hours without a disabling injury.

Medusa limestone quarry, York, York County, Pennsylvania, operated by Medusa Portland Cement Company, worked 154,457 man-hours without a disabling injury.

Louisville limestone quarry, Louisville, Cass County, Nebraska, operated by Ash Grove Lime & Portland Cement Company, worked 149,903 man-hours without a disabling injury.

Permanente limestone quarry, Permanente, Santa Clara County, California, operated by Permanente Cement Company, worked 141,-779 man-hours without a disabling injury.

Klondike limestone quarry, Oro Grande, San Bernardino County, California, operated by Riverside Cement Company, worked 135,-675 man-hours without a disabling injury.

Gibsonburg lime and limestone quarry, Gibsonburg, Sandusky County, Ohio, operated by The Kelley Island Lime and Transport Company, worked 131,601 man-hours without a disabling injury.

North Branford No. 7 crushed stone quarry, North Branford, New Haven County, Connecticut, operated by New Haven Trap Rock Company, worked 129,945 man-hours without a disabling injury.

St. Stephens limestone quarry, St. Stephens, Washington County, Alabama, operated by Lone Star Cement Corporation, worked 128,687 man-hours without a disabling injury.

Steelton limestone quarry, Steelton, Dauphin County, Pennsylvania, operated by Bethlehem Steel Company, worked 120,638 man-hours without a disabling injury.

Earlham limestone quarry, Earlham, Madison County, Iowa, operated by Marquette Cement Manufacturing Company, worked 111,439 man-hours without a disabling injury.

Chanute limestone quarry, Chanute, Neosho County, Kansas, operated by Ash Grove Lime and Portland Cement Company, worked 109,056 man-hours without a disabling injury.

Dixon limestone quarry, Dixon, Lee County, Illinois, operated by Medusa Portland Cement Company, worked 107,169 man-hours without a disabling injury.

Granite Canon ballast quarry, Cheyenne, Laramie County, Wyoming, operated by Morrison-Knudsen Company, Incorporated, worked 105,452 man-hours without a disabling injury.

Delta slate quarry, Delta, York County, Pennsylvania, operated by The Funkhouser Company, worked 104,400 man-hours without a disabling injury.

Diamond limestone quarry, Middle Branch, Stark County, Ohio, operated by The Diamond Portland Cement Company, worked 103,682 man-hours without a disabling injury.

Fairborn limestone quarry, Fairborn, Greene County, Ohio, operated by Southwestern Portland Cement Company, worked 101,024 man-hours without a disabling injury.

Mason City limestone and shale quarry, Mason City, Cerro Gordo County, Iowa, operated by Lehigh Portland Cement Company, worked 97,717 man-hours without a disabling injury.

Nazareth cement rock quarry, Nazareth, Northampton County, Pennsylvania, operated by Lone Star Cement Corporation, worked 95,274 man-hours without a disabling injury.

White Haven sandstone quarry, White Haven, Luzerne County, Pennsylvania, operated by The General Crushed Stone Company, worked 95,186 man-hours without a disabling injury.

Clinchfield Plant No. 2 limestone quarry, Clinchfield, Houston County, Georgia, operated by Penn-Dixie Cement Corporation, worked 93,179 man-hours without a disabling injury.

Portland limestone quarry, Portland, Fremont County, Colorado, operated by Ideal Cement Company, worked 91,422 man-hours without a disabling injury.

Plant No. 3 limestone quarry, Richard City, Marion County, Tennessee, operated by Penn-Dixie Cement Corporation, worked 90,283 man-hours without a disabling injury.

Martins Creek limestone quarry, Martins Creek, Northampton County, Pennsylvania, operated by Alpha Portland Cement Company, worked 89,878 man-hours without a disabling injury.

Natividad dolomite quarry, Natividad, Monterey County, California, operated by Kaiser Aluminum & Chemical Corporation, worked 88,800 man-hours without a disabling injury.

Bethlehem limestone quarry, Bethlehem, Northampton County, Pennsylvania, operated by Bethlehem Steel Company, worked 88,384 man-hours without a disabling injury.

Greencastle No. 2 crushed stone quarry, Greencastle, Putnam County, Indiana, operated by The Ohio & Indiana Stone Corporation, worked 87,483 man-hours without a disabling injury.

Frazier limestone quarry, East Fultonham, Muskingum County, Ohio, operated by Columbia Cement Division of the Pittsburgh Plate Glass Company, worked 85,897 man-hours without a disabling injury.

Oglesby limestone quarry, Oglesby, La Salle County, Illinois, operated by Lehigh Portland Cement Company, worked 85,494 man-hours without a disabling injury.

Ohio dolomite quarry, Millersville, Sandusky County, Ohio, operated by The J. E. Baker Company, worked 83,512 man-hours without a disabling injury.

No. 7 cement rock and limestone quarry, West Coplay, Lehigh County, Pennsylvania, operated by Coplay Cement Manufacturing Company, worked 82,520 man-hours without a disabling injury.

Greencastle limestone quarry, Greencastle, Putnam County, Indiana, operated by Lone Star Cement Corporation, worked 81,346 man-hours without a disabling injury.

Rock Hill traprock quarry, Quakertown, Bucks County, Pennsylvania, operated by The General Crushed Stone Company, worked 80,518 man-hours without a disabling injury.

Northampton cement rock quarry, Northampton, Northampton County, Pennsylvania, operated by Universal Atlas Cement Company, worked 79,863 man-hours without a disabling injury.

Thomaston limestone quarry, Thomaston, Knox County, Maine, operated by Dragon Cement Company, Incorporated, worked 78,987 man-hours without a disabling injury.

Davenport limestone quarry, Davenport, Scott County, Iowa, operated by Dewey Portland Cement Company, worked 78,440 man-hours without a disabling injury.

Phillipsburg limestone quarry, Phillipsburg, Montgomery County, Ohio, operated by The Laura Gravel & Stone Company, worked 78,000 man-hours without a disabling injury.

Silica crushed stone quarry, Sylvania, Lucas County, Ohio, operated by Toledo Stone & Glass Sand Company, worked 75,-973 man-hours without a disabling injury.

Blue Mount traprock quarry, Blue Mount, Baltimore County, Maryland, operated by The J. E. Baker Company, worked 75,032 man-hours without a disabling injury.

Ormrod limestone and cement stone quarry, Ormrod, Lehigh County, Pennsylvania, operated by Lehigh Portland Cement Company, worked 74,316 man-hours without a disabling injury.

Brodhead cement rock quarry, Brodhead, Northampton County, Pennsylvania, operated by National Portland Cement Company, worked 73,897 man-hours without a disabling injury.

Union Bridge limestone quarry, Union Bridge, Frederick and Carroll Counties, Maryland, operated by Lehigh Portland Cement Company, worked 72,603 man-hours without a disabling injury.

Stephens City limestone quarry, Stephens City, Frederick County, Virginia, operated by M. J. Grove Lime Company, worked 70,-440 man-hours without a disabling injury.

Birmingham limestone quarry, Birmingham, Jefferson County, Alabama, operated by Lone Star Cement Corporation worked 69,977 man-hours without a disabling injury.

Inwood limestone quarry, Inwood, Berkeley County, West Virginia, operated by The J. E. Baker Company, worked 69,272 man-hours without a disabling injury.

Keystone cement rock quarry, Bath, Northampton County, Pennsylvania, operated by Keystone Portland Cement Company, worked 69,143 man-hours without a disabling injury.

Jordanville limestone quarry, Jordanville, Herkimer County, New York, operated by The General Crushed Stone Company, worked 68,939 man-hours without a disabling injury.

Spencer crushed stone quarry, Spencer, Owen County, Indiana, operated by France Stone Products, Incorporated, worked 65,844 man-hours without a disabling injury.

Bonner Springs limestone quarry, Bonner Springs, Wyandotte County, Kansas, operated by Lone Star Cement Corporation, worked 65,521 man-hours without a disabling injury.

Birmingham limestone quarry, Tarrant, Jefferson County, Alabama, operated by Lehigh Portland Cement Company, worked 64,837 man-hours without a disabling injury.

Mendota limestone quarry, Mendota, Dakota County, Minnesota, operated by J. L. Shiely Company, worked 63,578 man-hours without a disabling injury.

Billmeyer dolomite quarry, Bainbridge, Lancaster County, Pennsylvania, operated by The J. E. Baker Company, worked 63,376 man-hours without a disabling injury.

Stockertown cement rock quarry, Stockertown, Northampton County, Pennsylvania, operated by Hercules Cement Corporation, worked 62,470 man-hours without a disabling injury.

Cedar Hollow lime quarry, Devault, Chester County, Pennsylvania, operated by Warner Company, worked 62,167 man-hours without a disabling injury.

Fort Worth limestone quarry, Fort Worth, Tarrant County, Texas, operated by Trinity Portland Cement Division of the General

Portland Cement Company, worked 62,068 man-hours without a disabling injury.

Bloomville crushed stone quarry, Bloomville, Seneca County, Ohio, operated by The France Company, worked 61,036 man-hours without a disabling injury.

Hudson limestone quarry, Hudson, Columbia County, New York, operated by Lone Star Cement Corporation, worked 60,000 man-hours without a disabling injury.

Okay Annona chalk quarry, Okay, Howard County, Arkansas, operated by Ideal Cement Company, worked 59,736 man-hours without a disabling injury.

Dallas limestone and shale quarry, Dallas, Dallas County, Texas, operated by Lone Star Cement Corporation, worked 59,468 man-hours without a disabling injury.

Plant No. 1 crushed traprock quarry, Middlefield, New Haven County, Connecticut, operated by New Haven Trap Rock Company, worked 59,410 man-hours without a disabling injury.

Reliance "B" cement rock quarry, Egypt, Lehigh County, Pennsylvania, operated by Giant Portland Cement Company, worked 59,349 man-hours without a disabling injury.

Plymouth Meeting dolomitic limestone quarry, Plymouth Meeting, Montgomery County, Pennsylvania, operated by G. & W. H. Corson, Incorporated, worked 58,240 man-hours without a disabling injury.

Bennie and Harvey monumental stone quarry, Lexington, Oglethorpe County, Georgia, operated by Bennie & Harvey Company, worked 53,760 man-hours without a disabling injury.

Boettcher limestone quarry, LaPorte, Larimer County, Colorado, operated by Ideal Cement Company, worked 52,080 man-hours without a disabling injury.

New Braunfels limestone quarry, New Braunfels, Comal County, Texas, operated by United States Gypsum Company, worked 51,030 man-hours without a disabling injury.

National City gypsum rock quarry, National City, Iosco County, Michigan, operated by National Gypsum Company, worked 50,041 man-hours without a disabling injury.

York limestone quarry, York, York County, Pennsylvania, operated by National Gypsum Company, worked 50,000 man-hours without a disabling injury.

Sylvania limestone quarry, Sylvania, Lucas County, Ohio, operated by Medusa Portland Cement Company, worked 49,928 man-hours without a disabling injury.

Martha limestone quarry, Martha, Wilson County, Tennessee, operated by Marquette Cement Manufacturing Company, worked 49,218 man-hours without a disabling injury.

Newton limestone quarry, Waterloo, Black Hawk County, Iowa, operated by Waterloo Dredging Company, worked 48,430 man-hours without a disabling injury.

Unit No. 1 limestone and shale quarry, Dallas, Dallas County, Texas, operated by Trinity Portland Cement Division of the General Portland Cement Company, worked 47,822 man-hours without a disabling injury.

Marquette limestone quarry, Cape Girardeau, Cape Girardeau County, Missouri, operated by Marquette Cement Manufacturing Company, worked 47,462 man-hours without a disabling injury.

Lehigh limestone and brownstone shale quarry, Mitchell and Brownstown, Lawrence and Jackson Counties, Indiana, operated by Lehigh Portland Cement Company, worked 47,167 man-hours without a disabling injury.

Iola limestone and shale quarry, Iola, Allen County, Kansas, operated by Lehigh Portland Cement Company, worked 45,810 man-hours without a disabling injury.

Evansville cement rock quarry, Evansville, Berks County, Pennsylvania, operated by Allentown Portland Cement Company, worked 45,491 man-hours without a disabling injury.

St. Louis limestone quarry, St. Louis, St. Louis County, Missouri, operated by Alpha Portland Cement Company, worked 45,450 man-hours without a disabling injury.

Howes Cave limestone quarry, Howes Cave, Schoharie County, New York, operated by North American Cement Corporation, worked 45,163 man-hours without a disabling injury.

Birmingham limestone quarry, Birmingham, Jefferson County, Alabama, operated by Alpha Portland Cement Company, worked 44,881 man-hours without a disabling injury.

Evans limestone quarry, Evans, Stevens County, Washington, operated by United States Gypsum Company, worked 44,556 man-hours without a disabling injury.

Luckey limestone quarry, Luckey, Wood County, Ohio, operated by National Gypsum Company, worked 43,472 man-hours without a disabling injury.

Hecker crushed stone and agricultural lime quarry, Hecker, St. Clair County, Illinois, operated by Hecker Quarry, Incorporated, worked 42,807 man-hours, without a disabling injury.

Asbury Knoxville lime quarry, Knoxville, Knox County, Tennessee, operated by The Standard Lime and Stone Company, worked 39,936 man-hours without a disabling injury.

Devil's Slide limestone quarry, Devil's Slide, Morgan County, Utah, operated by Ideal Cement Company, worked 39,692 man-hours without a disabling injury.

Charmian roofing-granules quarry, Blue Ridge Summit, Franklin County, Pennsylvania, operated by The Funkhouser Company, worked 38,761 man-hours without a disabling injury.

Montgomeryville crusher and building stone quarry, Montgomeryville, Montgomery County, Pennsylvania, operated by Montgomery Stone Company, worked 34,820 man-hours without a disabling injury.

Ormrod dolomitic limestone quarry, Ormrod, Lehigh County, Pennsylvania, operated by Lehigh Stone Company, worked 32,772 man-hours without a disabling injury.

Prospect Stone Plant No. 6 limestone quarry, Prospect, Oneida County, New York, operated by Eastern Rock Products, Incorporated, worked 31,737 man-hours without a disabling injury.

Unit No. 2 limestone and shale quarry, Dallas, Dallas County, Texas, operated by Trinity Portland Cement Division of the General Portland Cement Company, worked 30,906 man-hours without a disabling injury.

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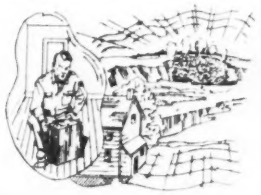

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NEWS from the Field . . . as reported by . . .

ARKANSAS — "2000 hours on my *600* with no trouble of any kind. Holding 100 pounds pressure while operating two 4" wagon drills." Stays on till the job is done — that's the way the Gardner-Denver *600* is built.

PENNSYLVANIA — "Have two WH600 Portables operating side by side . . . keeping the job right on schedule...have required only routine maintenance."

W. VIRGINIA — "In continuous service . . . and running like a watch." Starts easily — keeps on going. No tricky adjustments to require constant attention.

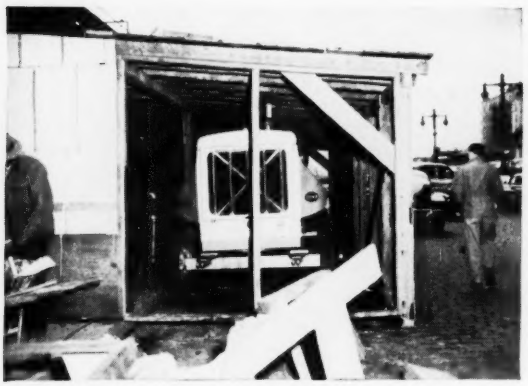
Contractors now using the GARDNER-DENVER 600

PENNSYLVANIA — "Side by side test convinced us the *600* saves fuel . . . as much as one gallon in four on our job." The *600* is economical with oil, too.

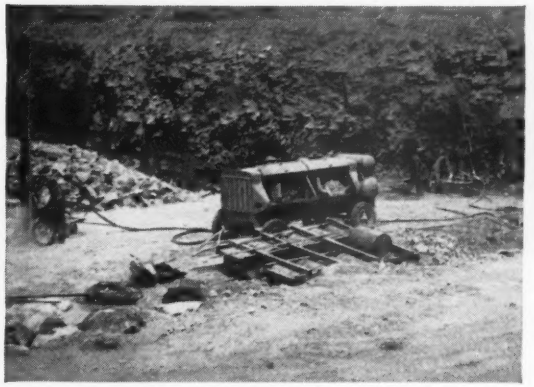
WASHINGTON — "Our regular operator required no special training to run the *600*. Well pleased with the performance of this heavy-duty unit."

CALIFORNIA — "Around the clock operation . . . have five machines in continuous service . . . very satisfactory." Ask the men who use the *600*.

CANADA — "Increased drilling footage . . . running my *600* ten hours a day with no trouble." The *600* speeds your work — increases profits.



NEW YORK — "Smooth and quiet . . . even at full capacity." Balance a 50-cent piece on an operating *600* — see for yourself how free it is from vibration.



KANSAS — "Have one of the first machines built . . . highly pleased. Operating two 4" wagon drills." The *600* will see you through many a tough job.

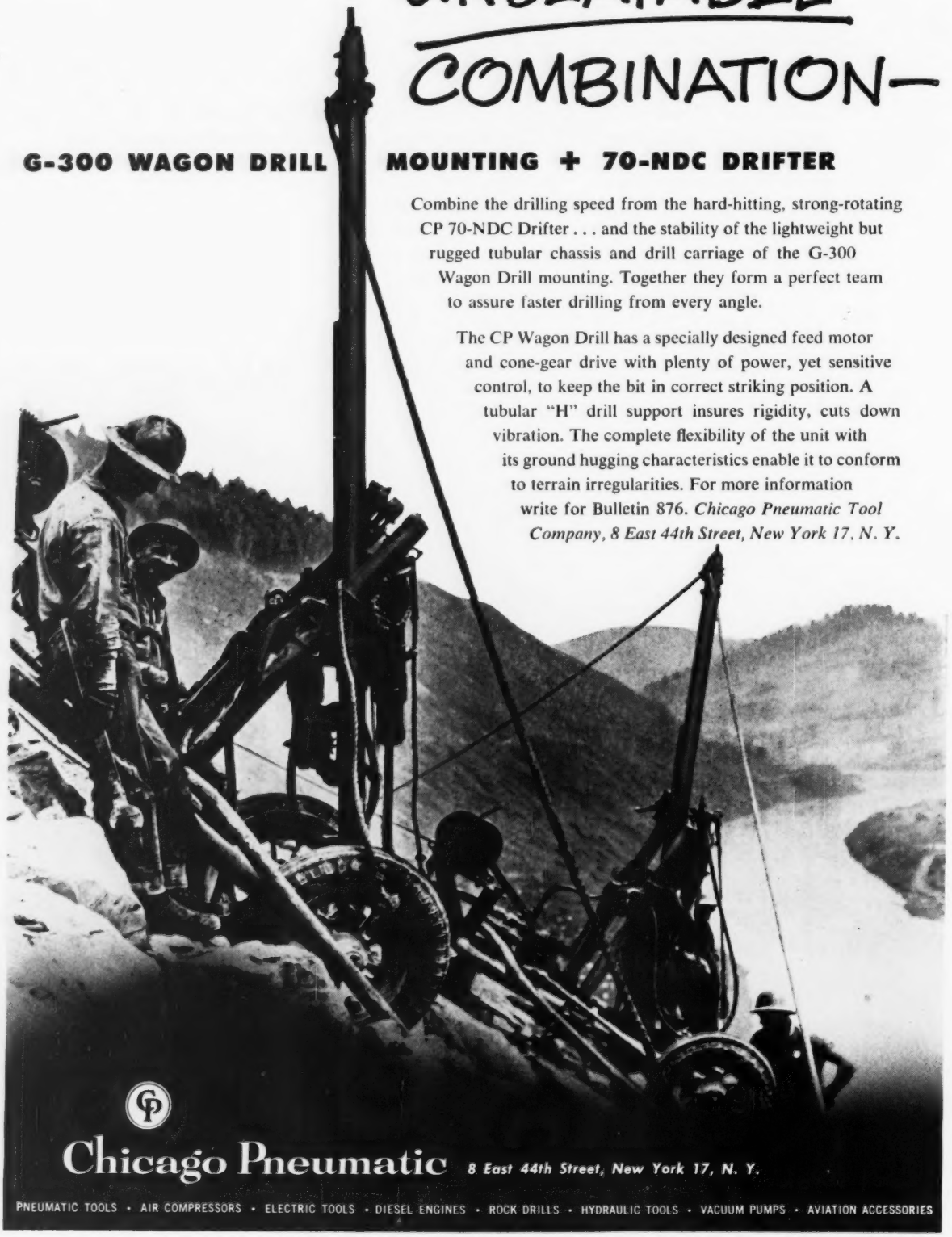
For complete information, write to Gardner-Denver Company, Quincy, Illinois. In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 13, Ontario. Since 1859. The quality leader in compressors, pumps and rock drills for construction, mining, petroleum and general industry.

AN UNBEATABLE COMBINATION—

G-300 WAGON DRILL MOUNTING + 70-NDC DRIFTER

Combine the drilling speed from the hard-hitting, strong-rotating CP 70-NDC Drifter . . . and the stability of the lightweight but rugged tubular chassis and drill carriage of the G-300 Wagon Drill mounting. Together they form a perfect team to assure faster drilling from every angle.

The CP Wagon Drill has a specially designed feed motor and cone-gear drive with plenty of power, yet sensitive control, to keep the bit in correct striking position. A tubular "H" drill support insures rigidity, cuts down vibration. The complete flexibility of the unit with its ground hugging characteristics enable it to conform to terrain irregularities. For more information write for Bulletin 876. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*



Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

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"Plain Primacord will hug the Plastic in a tight double hitch..

"I use Plastic Reinforced Primacord for unusual wet conditions, and in deep holes, or wherever field shots must stand a long time before blasting. It has a tough, plastic cover and will take a lot of punishment. It is not affected by high summer heat or winter cold.

"I use a trunk line of flexible Plain Primacord and make a double half hitch around the Plastic Reinforced branch line at a right angle, like this. The textile covered Plain Primacord grips securely in a tight double loop around the plastic cover without slipping.

"Tight right-angle Primacord connections all along the line go a long way toward giving you a good shot every time."

Ask your explosives supplier or write for further facts to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Also Safety Fuse Since 1836

Here **Plastic Reinforced Primacord** is used for the branch line, and **Plain Primacord** for the trunk line. Note the double half hitch around the plastic cover. It pulls up tight and stays that way.

Other brands to serve your needs are: **Reinforced Primacord,** for deep holes and resistance to abrasion; and **Wire Countered Primacord,** for deep, ragged holes.

P-3

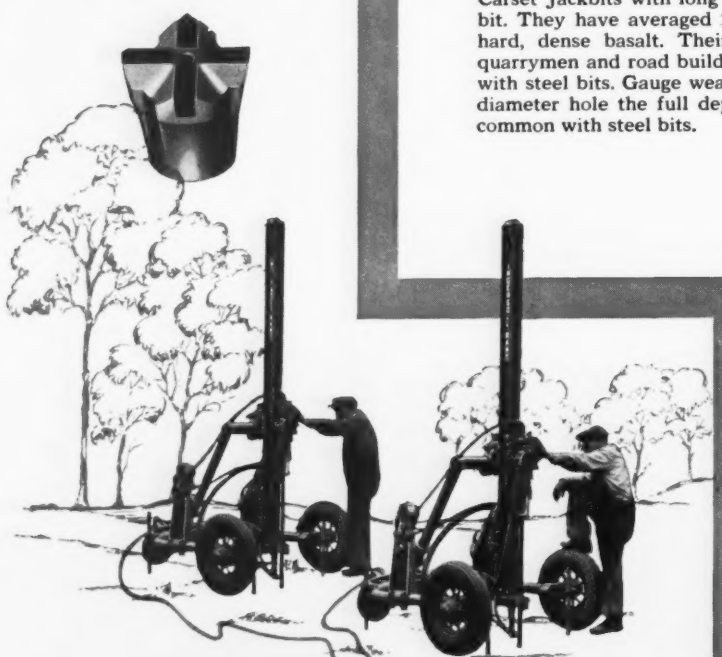
Use PRIMACORD

The PROVED and APPROVED DETONATING FUSE

3 steps to faster drilling

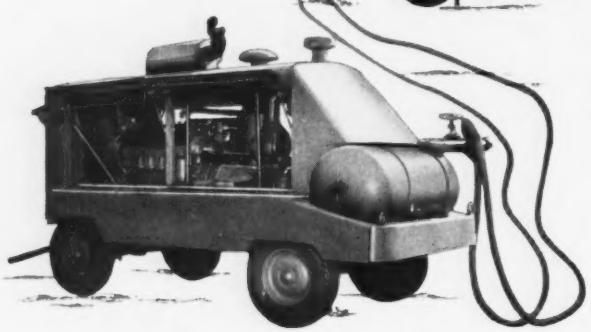
1. Bits That Cut Faster—Stay Sharper Longer

Carset Jackbits with long lasting Carboloy inserts give more footage per bit. They have averaged 260 feet—compared to 1 foot for steel bits—in hard, dense basalt. Their higher drilling speeds have enabled many quarrymen and road builders to complete five blast holes for every three with steel bits. Gauge wear is so low that one bit will produce a uniform diameter hole the full depth of the bore—eliminating the tapered holes common with steel bits.



2. Powerful Fast-Working Drills

FM-3 wagon drills combine maximum drilling power with complete flexibility for drilling in any position. Mounting the hard-slugging X-71 WD rock drill, the FM-3 is unexcelled for drilling speed and hole-cleaning ability. It handles 6-foot steel changes and drills holes up to 24 feet deep. An exclusive self-locking, slip-proof worm gear arrangement quickly raises or lowers the yoke into any position. The tower can be inclined to any desired angle and rotated at right angles to the carriage for operation in restricted areas. The wheels can be turned 90° for line holing close to a face.



3. Dependable, Economical Compressors

A GYRO-FLO 600 easily handles two FM-3 wagon drills. The portable two-stage rotary compressor supplies a smooth flow of air at all times—permits smoother operation of air tools. The "Air Glide" capacity control with "Floating Speed" control of engine keeps pressure between 100 and 110 psi at all times. The oil-cooling-lubrication system keeps discharge air temperatures below 200° and wear down to a minimum. The GYRO-FLO 600 can be moved quickly into new positions on the job because it is up to 40% lighter than other equal-capacity compressors. Other models—105, 210, 315 cfm.

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- Top quality machines that work as a team.
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another slugger in the OUTPUT lineup

Now — taking its place in the outstanding line of Bucyrus-Erie heavy-duty quarry and mine excavators is the field-proved 4½-yard 110-B — a convertible shovel-dragline which can give you bigger output in rock, ore, or dirt at lower cost than any other machine of like capacity on the market today.

Like the larger 150-B (6-yard) and 190-B (8-yard) machines, the 110-B features Bucyrus-Erie's exclusive shovel front end. The strong, light two-section boom reduces weight and speeds digging cycle, yet provides ample strength for tough digging. Tubular dipper handle, free to rotate in saddle block, permits digging with one corner of dipper without introducing torsional strains. Powerful effective rope crowd reduces swing inertia because crowd machinery is located on revolving frame. And, twin-dual hoist ropes concentrate power where needed to pull dipper through toughest banks.

Before you buy any machine in the 4½-yard range, investigate the 110-B. It will give you consistently large ouput at lowest cost per yard. For detailed information, write today for Bulletin 110-B-1.

4L53C

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Dynamite: Oil Detector

PROBLEM . . .

. . . to help professional oil "prospectors", or seismograph recording crews, to obtain more accurate subsurface surveys of prospective oil fields.

SOLUTION . . .

. . . special Hercules explosives which, detonated below the surface, provide positive seismograph recordings of the resulting shock waves. Among these are Vibrogels® . . . which detonate under severe water pressures; Spiralok® . . . rigid dynamite cartridge assembly that saves time in loading; and Vibrocaps® SR . . . detonators that reduce the danger of premature firing by static electricity and eliminate "time-lag" between firing and actual detonation of explosives charge.

RESULT . . .

. . . greater accuracy, efficiency, and economy in exploring potential sources of petroleum. Hercules' developments in dynamite and blasting supplies are helping to improve efficiency and cut costs wherever explosives are used in industry.

Hercules' business is solving problems by chemistry for industry . . .

. . . rubber, insecticides, adhesives, soaps, detergents, plastics, paint, varnish, lacquer, textiles, paper, to name a few, use Hercules® synthetic resins, cellulose products, chemical cotton, terpene chemicals, rosin and rosin derivatives, chlorinated products and other chemical processing materials. Hercules® explosives serve mining, quarrying, construction, seismograph projects everywhere.

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